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3/S by Sep 1992

Field Manual
No. 90-13

*FM 90-13

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 November 1978

RIVER CROSSING OPERATIONS

This manual provides tactics and techniques for river crossing operations in the **offense and retrograde**. The doctrine and techniques apply primarily to deliberate crossings—that is, when the crossing force or its assault element must have considerable support from higher echelons to overcome the obstacle. The manual concentrates operations on division-level, yet the principles are applicable to higher and lower levels of command. Emphasis is placed on conventional warfare with limited discussions of nuclear, chemical, and biological considerations.

Throughout this manual the word "he" is intended to include both the masculine and the feminine genders. Exceptions have been noted.

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*This publication supersedes FM 31-60, 27 March 1972.

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CHAPTER 1

crossing operation concepts

River crossing operations are an integral part of land warfare. The lethality of modern weapons and the capability of larger enemy formations dictate that crossing forces reduce their vulnerability by maintaining inherent mobility. The objective of any river crossing is to project combat power across a water obstacle while insuring the integrity and momentum of the force. Therefore, *whenever possible,* whether in the offense or retrograde, rivers must be crossed in stride as a continuation of the operation.

A river crossing is a special operation in that it requires additional planning and support. The obstacle may be a river, a lake, or a canal. Size and composition of the obstacle and the enemy situation will dictate how the crossing is to be made. It is normally conducted by a division; however, battalions and brigades may cross independently or as elements of the larger force.

Regardless of the obstacle, the enemy force or the size of the crossing force, *all* efforts must be directed toward crossing without loss of momentum. Only as a last resort will the force pause to build up combat power and equipment.

HOW THE FORCE CROSSES

ADVANCE PLANNING ESSENTIAL

Commanders should not surrender the initiative to the enemy by letting water obstacles needlessly affect their scheme of maneuver. Whenever possible, obstacles are *crossed in stride, using local materials and organic equipment.* This is referred to as a **hasty crossing** (see fig 1). There are times, however, when this is not possible and a build-up of forces and equipment is required in order to insure a successful crossing of the obstacle. When this is necessary momentum may be sacrificed. This operation is called a **deliberate crossing** (see fig 1). While in the defense it may become necessary to retrograde forces back across a water obstacle. This operation is referred to as a **retrograde crossing** (see fig 2).

HASTY OR DELIBERATE

- **A hasty river crossing** is a decentralized operation using organic, existing, or expedient crossing means. It is conducted as a continuation of the attack with little or no loss of momentum by the attacking force. A hasty crossing is *preferred* over a deliberate crossing.

As in other crossings, a hasty crossing must be anticipated and planned in advance. Routine procedures, such as command and control and location of AVLBs in the column, are specified in SOPs. Whenever possible, crossing sites are seized intact and in advance of leading elements.

MAINTAIN MOMENTUM

Because enemy resistance on both banks is negligible or light, a hasty crossing does not require that all enemy forces be cleared from the river line. It capitalizes on the enemy's confusion and lack of sufficient combat power to oppose the crossing.

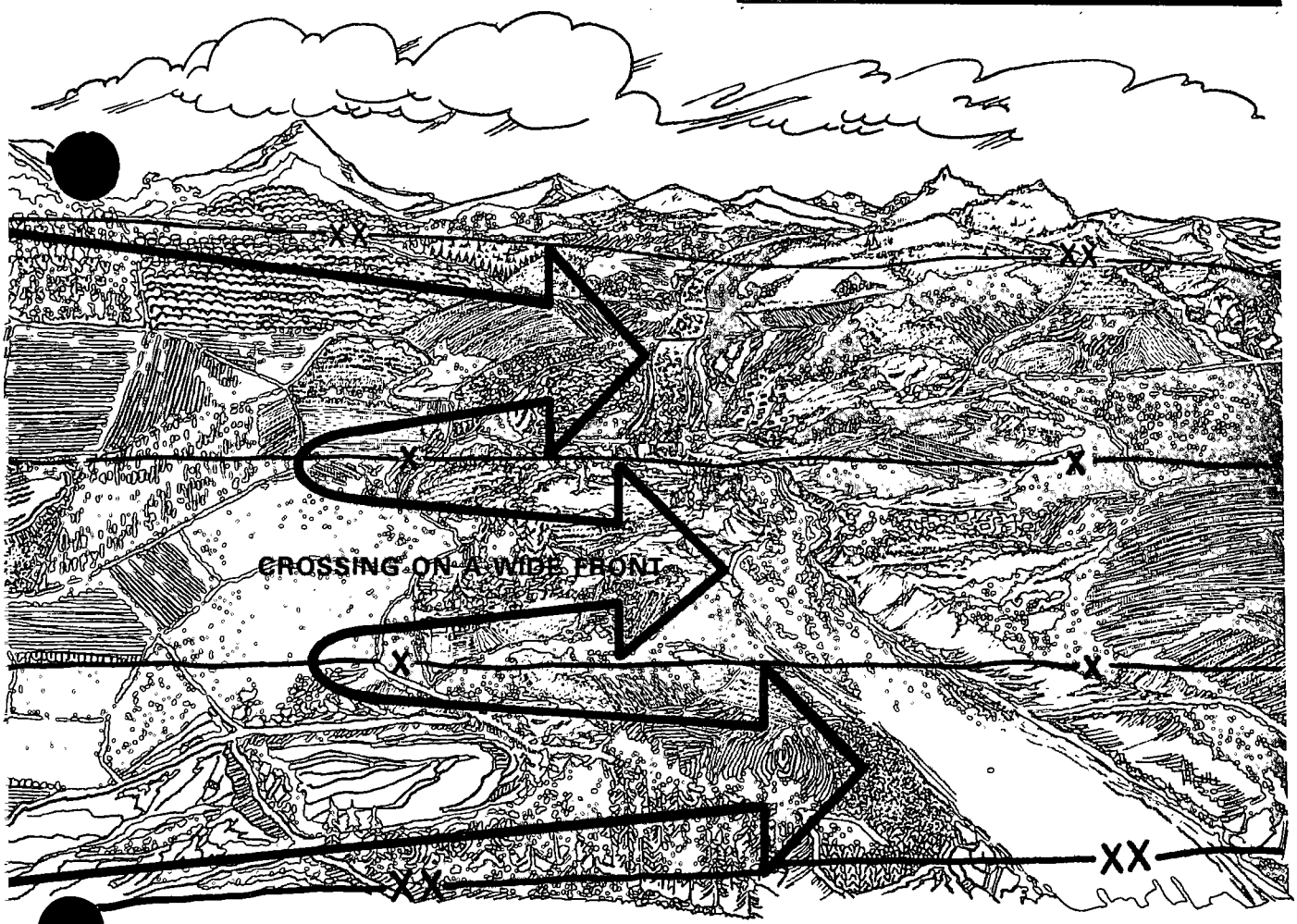
To maintain the momentum of the attack and to get maximum combat power across quickly, the force crosses the water

obstacle on a broad front. Therefore, whenever the force reaches the obstacle, day or night, the crossing is made. As the bulk of the assault units cross the obstacle, minimum forces are left to secure the crossing sites. The initial assault in the hasty crossing should result in the rapid seizure of sufficient area to insure that the crossing sites are relatively secure from enemy ground action and direct fire.

Doctrine and techniques of hasty river crossings are described in division operation manuals. Specifically see **FM 71-100, Armored and Mechanized Division Operations,** for the conduct of a hasty river crossing.

HASTY RIVER CROSSINGS are characterized by:

- **Speed, surprise, and minimum loss of momentum.**
- **Decentralized operations with organic, existing, or expedient resources.**
- **Weak enemy defenses on both banks.**
- **Minimum concentration of forces.**
- **A quick continuation of the attack.**



DELIBERATE RIVER CROSSINGS are characterized by:

- **The failure or infeasibility of a hasty river crossing.**
- **Detailed planning and centralized control.**
- **A deliberate pause to prepare, acquire additional bridging/rafting equipment, and concentrate combat power.**
- **Clearance of enemy forces from the entry bank.**

- **A deliberate river crossing** is required when a hasty crossing is not feasible, has failed, or when offensive operations must be renewed at the river line. It may be forced by a significant river obstacle and/or by a strong defending enemy.

Deliberate river crossings will not normally be conducted from march formations but will require a build-up of firepower and equipment on both entry and exit banks. Enemy forces must be cleared from the entry bank. Strong opposition on the exit bank dictates a deliberate crossing which provides for a phased build-up of combat power within the bridgehead. Further, deliberate crossings will be conducted when the water obstacle is severe and prohibits crossing with organic and expedient equipment.

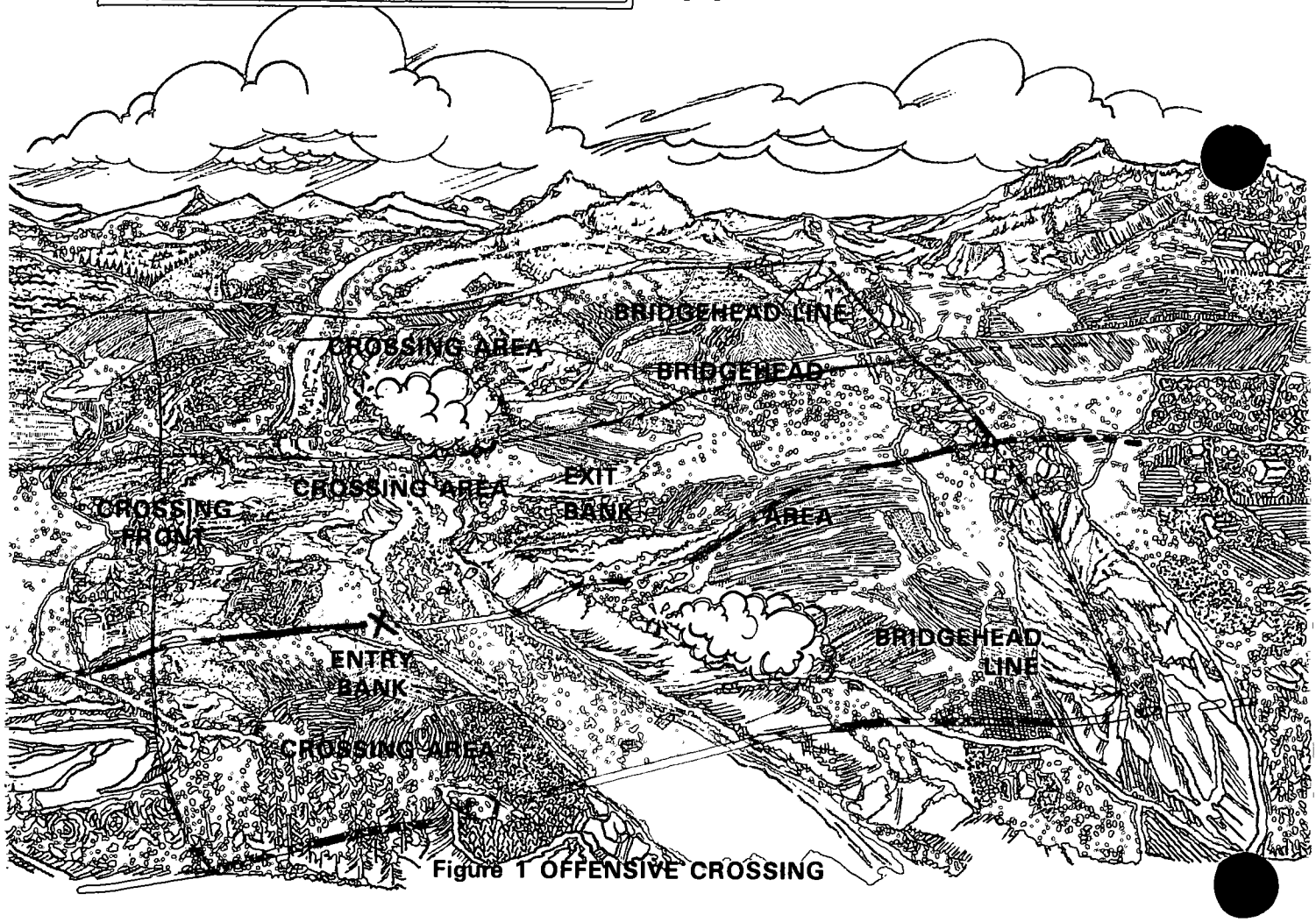


Figure 1 OFFENSIVE CROSSING

• **A retrograde river crossing** is applicable when enemy advances threaten to overwhelm the division, causing it to retrograde and subjecting it to an enemy pursuit. In this situation the retrograde crossing is conducted to:

• establish the defense on the exit bank or

• continue the retrograde to defensive positions beyond the water obstacle.

RETROGRADE RIVER CROSSINGS are characterized by:

- **Detailed planning and centralized control.**
- **Enemy control of maneuver initiative.**
- **High risk to friendly forces.**
- **Forces on exit bank providing overwatching fires.**
- **Forces delaying enemy's advances to trade space for time at the crossing sites.**

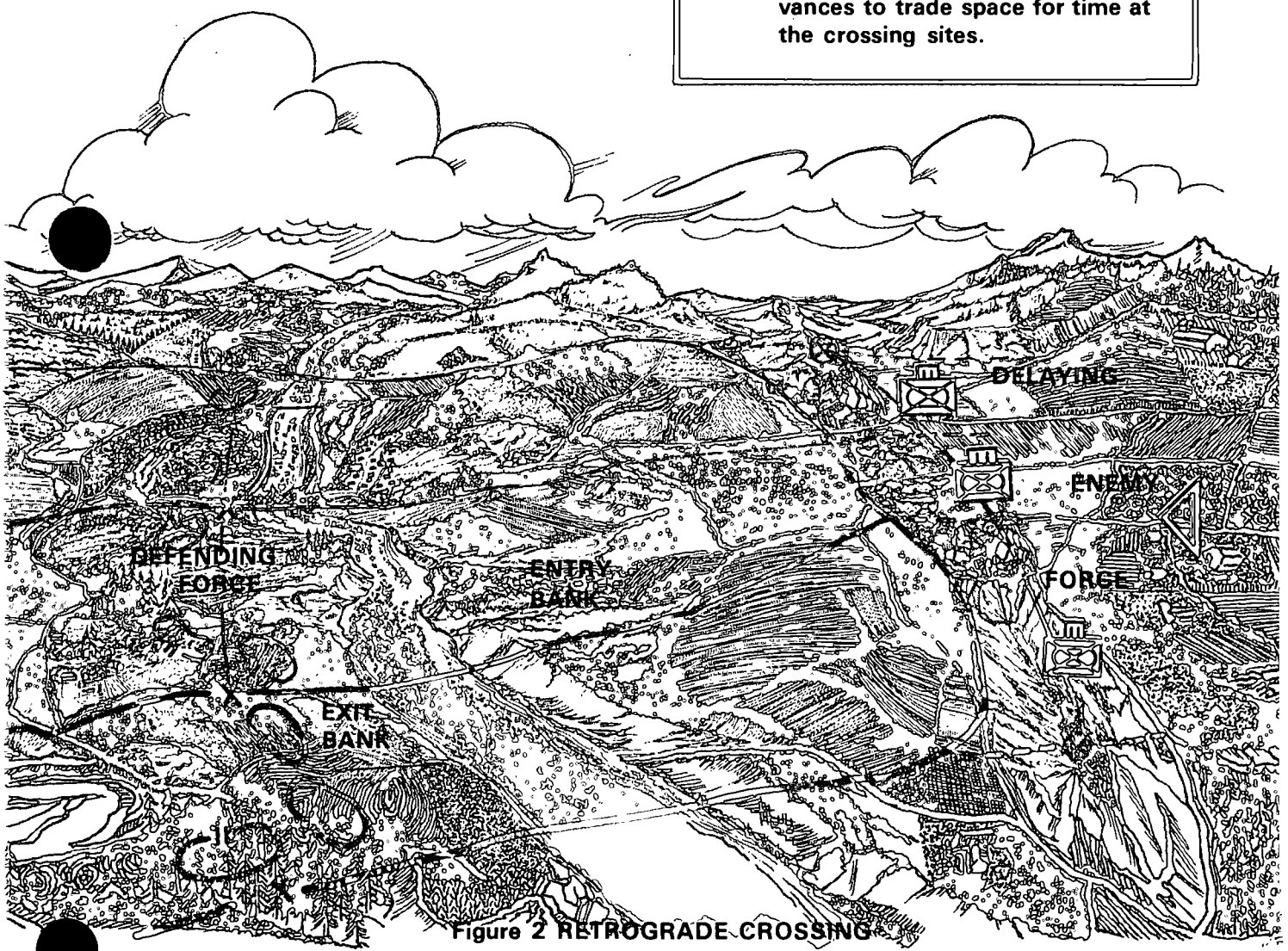


Figure 2 RETROGRADE CROSSING

CONSIDERATIONS FOR THE COMMANDER

Planning is CRITICAL to the success of a river crossing operation. There seldom will be adequate time to conduct the detailed planning desired. Therefore, it is imperative that adequate SOPs be developed to cover river crossing contingencies. Appendix G is provided as a representative crossing order/plan developed after detailed planning.

An **offensive river crossing** operation poses several problems to the commander which must be evaluated and resolved in order to overcome the negative aspects of the obstacle. The successful outcome of the operation depends on many factors:

- The severity of the obstacle.
- The enemy's use or defense of the obstacle.
- Command and coordination of the operation.
- Ability to effectively project overwhelming combat power across the obstacle to permit continuation of the mission.

The river obstacle, in many respects, is similar to any other extensive natural or manmade obstacle that restricts the planned movement of tactical forces. Locations must be chosen along the obstacle where elements can cross (figs 1 & 2). This usually requires that forces become canalized at the selected points, thus limiting the full application of their combat power and increasing vulnerability to enemy fire.

In a deliberate crossing, conditions may dictate crossing on a narrow front. *Use of a broad crossing front is desirable to reduce congestion and vulnerability.* The broad front is preferred because it will provide for rapid crossing of the entire force. Further, it may cause the defender to delay launching a counterattack against the crossing force until he can determine which crossing most seriously threatens his defense. If the enemy delays his counterattack too long, it will allow the attacking force time to build up combat power on the exit bank.

The characteristics of the obstacle and the amount of crossing equipment available will dictate the number of crossing sites. If there are no fording sites across the obstacle, vehicles cross by "swimming," rafting, or bridging. The routes of access and egress, the slope and stability of the river banks, and the depth and velocity of the water all impact on the requirement for support equipment, site preparation time, and the selection of feasible crossing points.

The enemy's defense or most probable course of action is evaluated in conjunction with the obstacle's physical characteristics. The enemy can choose to defend forward of, on, or beyond the obstacle. The weather, terrain, and enemy capabilities provide indications of his probable action. In any case, the enemy should be expected to oppose the development of crossing sites and attempt to defeat the crossing force when it is most vulnerable.

In addition to being canalized at the crossing sites, the crossing force is temporarily divided when part of it is across the obstacle and the remainder is not. This subjects the force to possible defeat in detail as commitment of combat power is piecemeal.

The commander may consider crossing the water obstacle during the hours of darkness to reduce the vulnerability of his force and to gain the advantage of surprise over the enemy.

EXERCISE COMMAND AND CONTROL

Command and control during the river crossing is perhaps the most difficult function of the operation. Centralized command of the operation insures coordination of support and assault forces. Positive control of crossing elements while concentrating, moving across, and dispersing increases the probability for success. However, there must be sufficient flexibility to permit adjustments in the plan and changes during execution.

PLAN

Planning includes providing enough space for support forces to work and for assault forces to concentrate before crossing. Otherwise, the support and assault forces become lucrative targets for conventional and nuclear fires. Traffic control during the operation is regulated by a timetable that gets maneuver forces and combat forces across in the right sequence while making efficient use of the crossing sites. Support force assets beyond the organic capability of the crossing force are often required.

CONTROL COMMUNICATIONS

Communications capacity may become saturated, requiring additional signal units and equipment for movement control and for combat units on both sides of the river. Imposing radio listening silence prior to the assault crossing places a greater dependence on wire communications. Additional communication security measures help to deceive the enemy as to when and where crossings are to be made.

CREATE DECEPTION PLAN

The difficulty of the entire operation makes it desirable to incorporate a *deception plan.* Since the enemy will be expecting a crossing, a deception plan which employs reconnaissance, site preparations, and build-up of forces at a time and/or location other than the actual crossing area may be effective in diluting his defensive capability.

Future tactical missions, river characteristics, and probable enemy defenses govern the plans for crossing. Unless the river features or enemy dispositions limit the courses of action, the crossing concentrates on securing a bridgehead which best facilitates future operations.

PLAN AS PART OF PRESENT AND FUTURE OPERATIONS

The river crossing operation is not a tactical mission in itself. Its purpose is to permit the force to overcome an obstacle quickly and continue advancing to destroy the enemy. Tactical objectives assigned by higher headquarters may or may not include terrain objectives within the bridgehead. However, terrain objectives and/or space are required to insure the security of the force and crossing sites. Thus, the river crossing, either hasty or deliberate, is a special operation planned as a part of and in conjunction with future operations.

CROSS AT NUMEROUS SITES WITH MAXIMUM POWER

Assault forces are assigned crossing areas and objectives which together comprise the bridgehead. Intermediate objectives are assigned as required. Crossing sites and areas that minimize the concentration of forces waiting to cross and the separation of combat power are selected on each side of the river. The crossing force commander offsets the inherent disadvantages of the obstacle by crossing at numerous sites with maximum combat power on a broad front, supported by heavy indirect fires. Air superiority, or parity, even though temporary, is required. The mission is accomplished through detailed planning and positive control of support and assault forces in each crossing area.

A **retrograde river crossing,** (fig 2), is conducted with the same detailed planning as a deliberate offensive crossing. A significant consideration is that failure of the retrograde on the *entry* bank may well result in loss of the entire force. The commander must get all non-essential combat and combat service support across the river and disperse them in locations that can

support the operation. The delaying force deceives and delays the enemy while a defense force is established on the exit bank. The delay force must be strong enough to hold the enemy forward of the holding line (fig 2) to allow sufficient time for uncommitted forces to cross and establish overwatching defensive positions.

FAIL ON ENTRY BANK. . . .
. . . .LOSE ENTIRE FORCE

The defending force on the exit bank accepts responsibility, on order, for the battle from the delaying force. The defending force then overwatches the crossing of the delaying force.

The retrograde force should expect that the enemy will detect the operation and attempt to counter it. Having the temporary advantage of combat power, the enemy pursuit may well include envelopment tactics to secure crossings and cut off the retrograde force before it can cross.

Contrary to the offensive operations, retrograde crossing sites are initially controlled by friendly forces. These sites may be insufficient in number, and it is reasonable to expect that they are also known to the enemy and will be attacked early in the operation. Development of additional sites provides insurance against this probability. Crossing sites must not be captured by enemy forces.

FRIENDLY FORCES
CONTROL CROSSING SITES

Tactical bridging and rafts should be salvaged for future requirements; however, it may be necessary to destroy them to prevent capture. Fixed bridging must be destroyed. This requires close coordination with the delaying force to preclude cutting off friendly forces or allowing enemy seizure of sites intact.

Command, control and coordination are difficult in a retrograde crossing. Delaying, defending, and support forces must have explicit missions and tasks. Initially, all forces continue the delay until designated forces are instructed to break contact and move over strictly controlled withdrawal

routes to crossing sites. This permits application of maximum combat power in the delay until the over-watching defense has attained enough combat power to take up the battle from the delay effort.

DECEIVE THE ENEMY

Ideally, deception is planned and executed to deceive the enemy regarding the retrograde. As a minimum, these plans seek to conceal the extent of the operation and the actual crossing sites to be used. Smoke, electronic deception, and dummy sites reduce the enemy's capability to disrupt the crossing. Operations security (OPSEC) measures must be applied to achieve successful river crossings, both offensive and retrograde. Enemy intelligence collectors will concentrate on identifying the time and place of such crossings.

OPSEC measures include concealing special river crossing equipment, confining the movement of this equipment to hours of darkness or reduced visibility, and concealing movement by smoke. Stereotyped patterns of preparation must be avoided or no deception plan will work. All planning must consider the current OPSEC posture of the unit and identify friendly vulnerabilities which might signal to the enemy the time and place of the intended river crossing. Some of these vulnerabilities can be overcome with proper camouflage, noise, thermal, electromagnetic and light discipline, and avoidance of patterns of tactical deployment in the build-up phase.

This is the general concept of river crossing operations; the types of crossings, and the problems facing the commander. Next are the intelligence aspects of the enemy, terrain, and the river.

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CHAPTER 2

the river, the terrain, and the enemy

It is necessary to plan for deliberate river crossing operations as far in advance as possible. Primary factors that directly influence all river crossings are the **river**, the **terrain**, and the **enemy**. The initial step in planning a river crossing operation is gathering data about the water obstacle, surrounding terrain, water conditions, and the enemy force. The sophisticated intelligence-gathering capability available at corps and higher levels provides the opportunity to complete some of the early planning well before the crossing operation *begins*. However, the special considerations of a river crossing necessitate up-to-date and detailed intelligence to plan and execute the operation successfully.

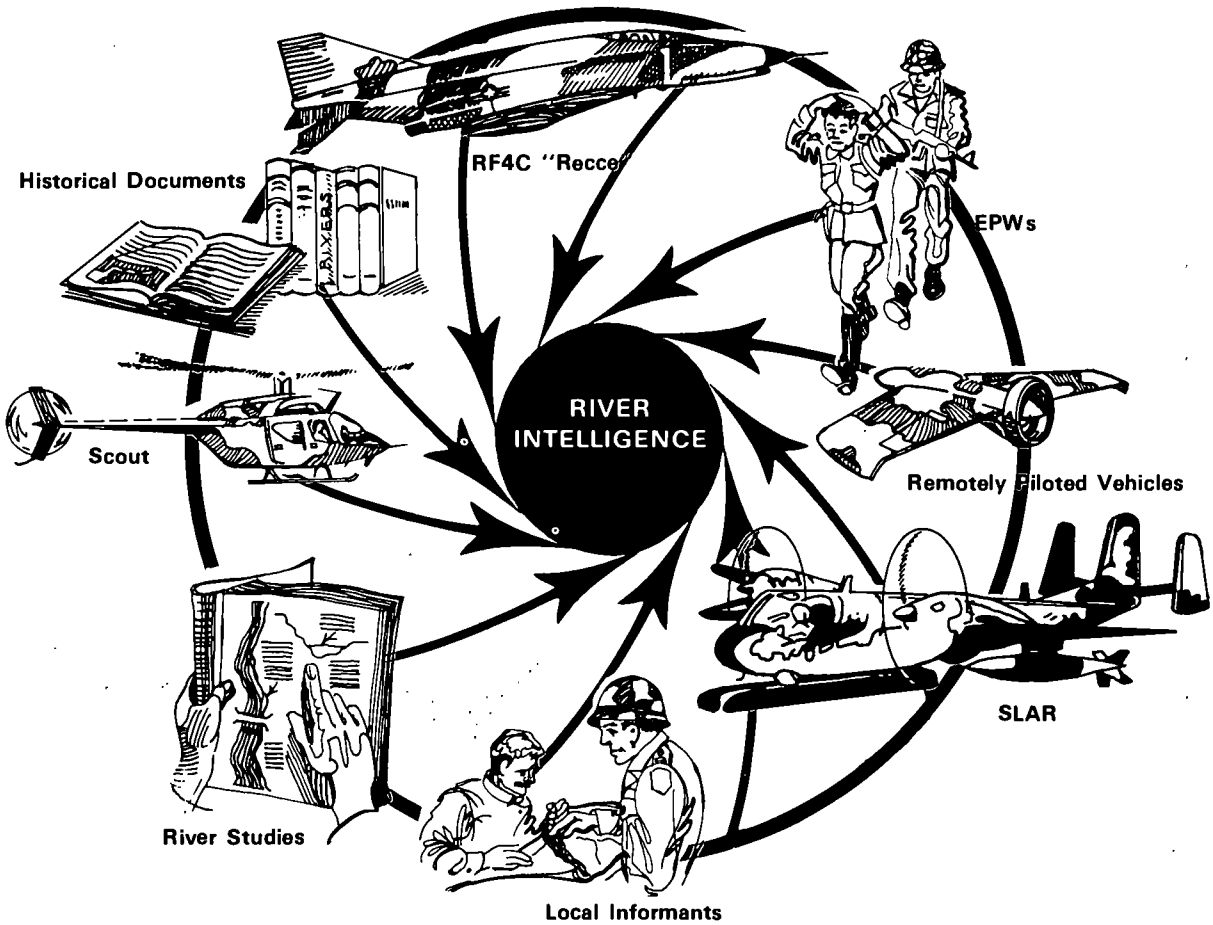
Much information is available through the use of air and ground cavalry and engineers who conduct reconnaissance operations well in advance of the arrival of leading units. The division obtains information from all available sources in order to enhance the crossing operation. Information is collected, evaluated, and disseminated to assault and support forces.

OBSTACLE AND TERRAIN DATA

General characteristics of most rivers in the world have been studied and recorded. Modern intelligence-gathering technology permits frequent revisions of existing data. Some rivers have been studied in sufficient detail to permit tentative selection of feasible crossing sites. However, precise information of specific river areas and the surrounding terrain is required.

Information for crossing of rivers under friendly control (e.g., retrograde crossings) are readily obtained by ground reconnaissance. For areas not under friendly control, revised data may be acquired by Army/Air Force aircraft or remotely piloted vehicles (RPVs) employing either photography or radar. During periods of limited visibility, radar and infrared imagery can be used to confirm feasibility of movement across existing sites.

Physical ground reconnaissance of tentative crossing sites is preferred. This enables the crossing force to visualize and plan support requirements and traffic control needs. Maneuver units with supporting engineer elements may be able to conduct a reconnaissance-in-force or deep patrols to obtain data. A reconnaissance of this nature is difficult for rivers located more than a few kilometers forward of friendly positions. Special units which infiltrate enemy territory to get the information

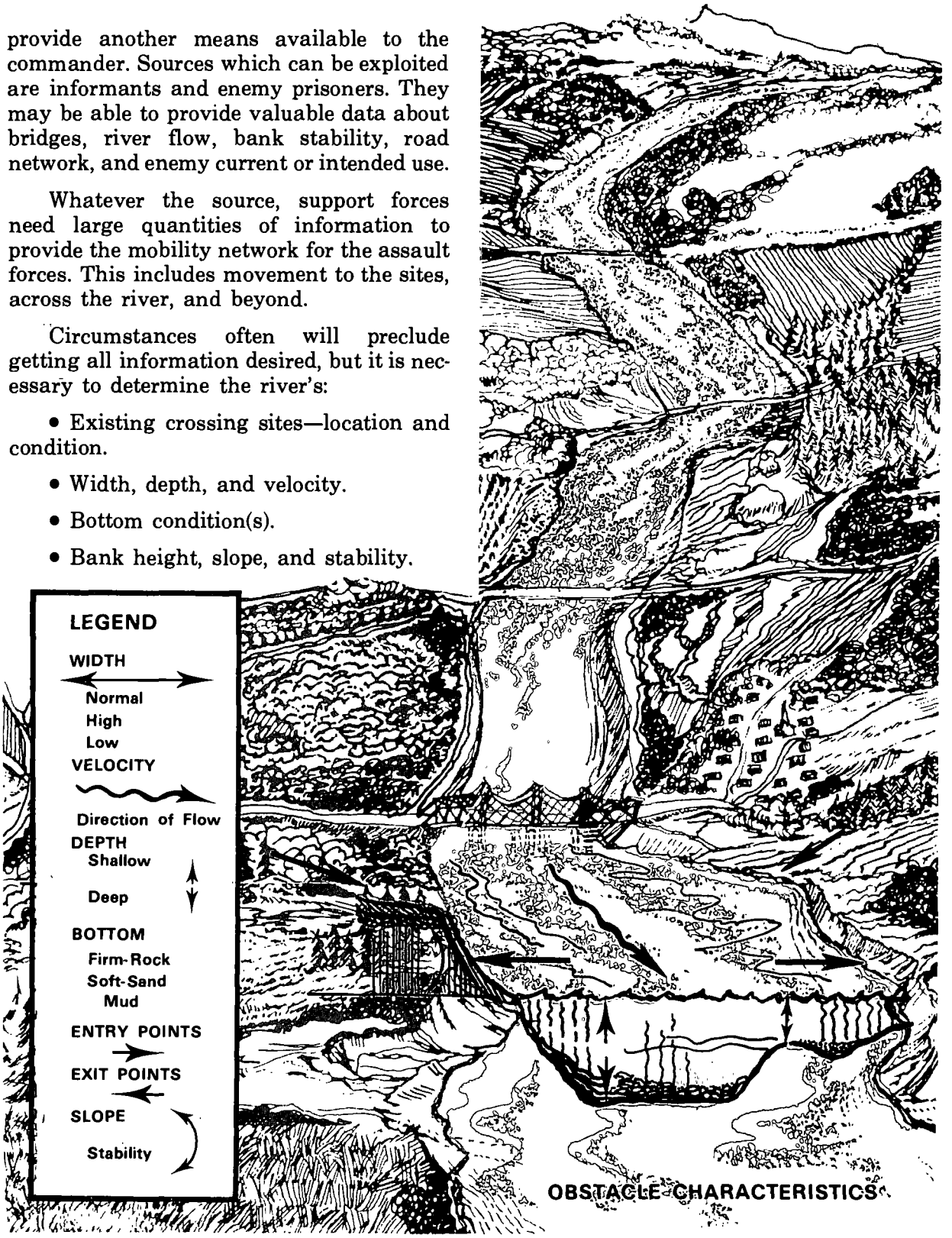


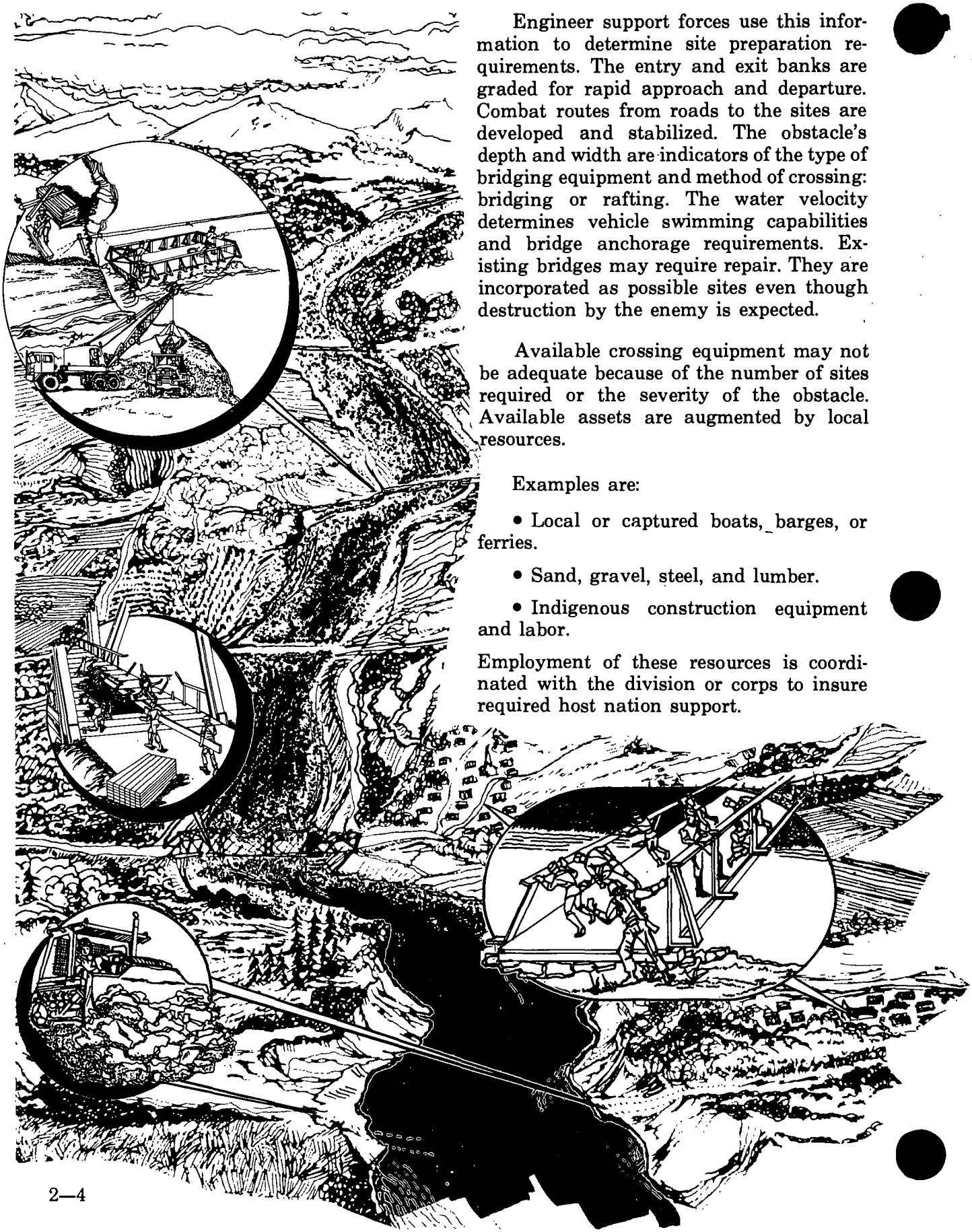
provide another means available to the commander. Sources which can be exploited are informants and enemy prisoners. They may be able to provide valuable data about bridges, river flow, bank stability, road network, and enemy current or intended use.

Whatever the source, support forces need large quantities of information to provide the mobility network for the assault forces. This includes movement to the sites, across the river, and beyond.

Circumstances often will preclude getting all information desired, but it is necessary to determine the river's:

- Existing crossing sites—location and condition.
- Width, depth, and velocity.
- Bottom condition(s).
- Bank height, slope, and stability.





Engineer support forces use this information to determine site preparation requirements. The entry and exit banks are graded for rapid approach and departure. Combat routes from roads to the sites are developed and stabilized. The obstacle's depth and width are indicators of the type of bridging equipment and method of crossing: bridging or rafting. The water velocity determines vehicle swimming capabilities and bridge anchorage requirements. Existing bridges may require repair. They are incorporated as possible sites even though destruction by the enemy is expected.

Available crossing equipment may not be adequate because of the number of sites required or the severity of the obstacle. Available assets are augmented by local resources.

Examples are:

- Local or captured boats, barges, or ferries.
- Sand, gravel, steel, and lumber.
- Indigenous construction equipment and labor.

Employment of these resources is coordinated with the division or corps to insure required host nation support.

Terrain considerations are studied from two aspects: fighting the enemy and conducting the crossing operation. Both are analyzed together. Terrain characteristics encompass:

- Avenues of approach to the river and from exits to objectives.
- Combat routes leading to and away from the river.
- Covered, concealed, and dispersed assembly areas near the entry bank for assault or delaying forces.
- Work areas for support forces.
- Low-altitude air routes and landing areas.
- Fighting positions for forces overwatching the crossing of assault or delaying forces.
- Effects of weather on: soil trafficability, the use of smoke or incendiaries, and employment of nuclear and chemical weapons.

Additional considerations which affect the site planning and effort include:

- **Predictions or historical records to estimate sudden increase or decrease in river flow.**
- **Floating debris (e.g., ice or trees).**
- **Tidal flow, crosscurrents, or undertow.**
- **Weather effects on visibility, soil trafficability, equipment, and personnel efficiency.**

THE ENEMY

All units of the crossing force require knowledge of enemy capabilities. One of the most important considerations to determine is what capability does the enemy have to interdict the crossing force while its combat power is divided by the obstacle. Routine intelligence of enemy activity prior to the crossing operation answers many questions, but not all.

Offensive crossings require a thorough understanding of enemy tactics for defense of a river line. Retrograde crossings must thwart enemy exploitation or pursuit operations to secure crossings and/or to encircle forces.

ENEMY RIVER DEFENSE

The enemy considers a water obstacle a natural barrier enabling a strong defense with relatively small forces on a wide front. The enemy prefers to defend on the bank of the river that is under his complete control. He does, however, maintain the options of defending forward of the river or to the rear of the river line. The choice depends on the terrain, forces available, and the strength of the attacker.

To defend **forward of the riverline,** the enemy considers the terrain and its defensive characteristics. He evaluates his adversary's ability to develop combat power and his own capability to overcome it. He may defend forward when the terrain is favorable, or when he has sufficient reserve combat power, or when he plans to resume the offense immediately. He also weighs the severity of the obstacle, the impact of losing control of crossing sites, and the possibility of being cut off from supply lines.

When defending forward, the enemy intends to defeat the crossing force before it reaches the river. The enemy will place his defensive forces as far forward of the river line as possible. This defensive posture, as a minimum, includes the main defensive belt which is comprised of first echelon divisions. First echelon regiments of these divisions establish initial defensive positions approximately 10-15 kilometers from the river. Positions occupied by second echelon regiments are developed within a few kilometers of the river. These positions are astride major avenues of approach to block attacking forces so that a counterattack can destroy them. Loss of these positions would enable the crossing force to gain access to the river. The counterattack force is positioned in front of or behind the second defensive position to strike attacking forces in the flank from areas providing good mobility.

When the main defensive belt is forward of the river, the second and third defensive belts may be established to the rear of the river. How long they defend and where they are positioned are dependent on relative combat power and defensive strength of the terrain. These belts have the mission of protecting the crossing sites and defeating the attacking force during or after crossing. Counterattacks by forces from the higher echelon directing the defense are frequently employed.

In situations where sufficient space and defensible terrain exist forward of the river to permit the establishment of all defensive belts, the mission of the entire force is to defeat the attacker *before* reaching the river. The depth of the defensive zone is approximately 100 kilometers.

When defending **on the riverline,** the enemy places the majority of his forces as close to the exit bank as defensible terrain permits. Their mission is to protect the crossing sites and defeat the crossing force while it is divided by the river. The arrangement of defensive positions and belts is similar to the defense forward of the river, except that the distance between first and second echelon regiments may be less. This increases the volume of fires that may be placed on crossing sites and concentrates more force to defeat assaulting elements on the exit bank before they can consolidate combat power.

The enemy, after studying the terrain and crossing force capabilities, concentrates his defense on the high-speed avenues of approach to and beyond the river and on the most likely crossing sites. Security elements on the entry bank attempt to deceive advancing forces as to the location of the first defensive positions, to delay the crossing force, and to cause it to deploy early, thereby revealing assault force crossing areas and site locations. The security force also acts as forward observers for the employment of artillery and air support.

All possible efforts are made to destroy crossing force elements by indirect fire before they reach the river. Approach routes, defiles, and probable dispersal areas are targeted. Known or likely crossing sites are also targeted and given priority of fires as assault forces begin crossing. Usually, artillery is positioned well forward and employed in barrage fires to disrupt the advance to the river; destroy the crossing sites and/or crossing elements; and, finally, to destroy the assault forces as they are consolidating on the exit bank. All necessary measures are taken to counter airborne or airmobile attacks in rear areas. Air defense units are deployed throughout the area to counter enemy air attacks.

Electronic warfare is concentrated to disrupt the crossing force plan. Jamming and deception are used to degrade and confuse the traffic control of support and assault forces.

Existing bridges are destroyed and known crossing sites are mined or denied with other obstacles. Only a few sites are kept open for withdrawal of the predominantly amphibious security force. Obstacles are emplaced along approach and exit routes as well as the river banks. As time and assets permit, obstacles such as floating mines and underwater obstructions are added to further disrupt crossing efforts.

Forces in the first defensive echelon are positioned to bring maximum defensive fire on the assault forces. These forces engage the attacker at crossing sites and while he is crossing with all possible organic and support weapons. Their mission is to defeat the attacker before a bridgehead can be established on the near bank.

Second echelon battalions, astride major avenues of approach or egress routes from the river, block assault elements to enable counterattacking and reserve antitank forces to engage and destroy battalion or smaller assault elements. Divisional second echelon forces occupy positions 4-5 kilometers behind the first echelon. They provide depth to the defense, and it is from this area that local counterattacks are launched.

Second and third defensive belts may be established by army second echelon divisions. These forces add additional depth to the defense. The artillery from these divisions will be used to strengthen the overall fire support given the units in the first defensive belt. Should the attacker penetrate the main defensive belt, these subsequent belts will have the mission of destroying the attacker and launching the army counterattack.

Defense to the **rear of the riverline** is undertaken when time or terrain precludes establishing a defense forward of the river or on the exit bank, when immediately available forces are insufficient and time for concentration is required, or when terrain on the exit bank is not suitable for defense—or a combination of these.

In this situation, security forces are deployed on the exit bank with the mission of harassing, disrupting, and directing ground and aerial fires on the attacker's assault and support forces. The force seeks to delay the crossing force to provide time for the main defense to be established.

Indirect fires, air strikes, and electronic warfare are concentrated on crossing elements. The security forces destroy bridges and other crossing means, emplace obstacles at crossing sites and choke points, and attempt to deceive the crossing force as to the location and strength of the main defenses.

ENEMY OFFENSIVE RIVER CROSSING

The enemy is well aware that in any advance he will need to cross many water obstacles. His equipment, organization, and training are designed to insure that river crossings are regarded as a normal part of a day's advance which are to be carried out from the line of march whenever possible. Closing on a riverline or consolidating a bridgehead are not regarded as separate phases of the battle. The enemy's doctrine envisions both hasty and deliberate river crossings, with hasty crossing from the line of march as the preferred method.

Hasty Crossings

Every attempt will be made to cross a water obstacle and secure crossing facilities intact by closing with the withdrawing force or by pursuing them so closely as to prevent effective demolition. A helicopter assault may be conducted to seize crossings in advance of the leading troops. Forward detachments will often be detailed for this task. Reconnaissance and march security elements will attempt to cross immediately upon reaching the obstacle.

Enemy tank or motorized rifle divisions and regiments can make hasty river crossings independently on the march. Crossings made against strong resistance usually are conducted under division control, and those crossings against weak resistance are usually made under regimental control. Units are assigned definite crossing sites whose widths are determined by the existing situation. With a division, regimental crossing sites are usually 3—5 kilometers apart. The enemy prefers to conduct hasty crossings at night or at first light.

If the division advance guard units cannot seize a bridgehead, they secure the near bank so an assault crossing can be made by the division. Advance guard units send reconnaissance elements to reconnoiter the river and to select crossing points for amphibious vehicles, ferries, and bridges. Tanks with the advance guard are positioned to protect the division flanks. Antitank guns, heavy machineguns, and air defense elements are moved to the river where they can deliver direct fire on the opposite bank.

First echelon regiments move under the cover of darkness into assembly areas 2—5 kilometers from the far bank of the river, and the second echelon regiment occupies assembly areas 10—13 kilometers from the river. Crossing equipment joins assault units in their assembly areas and engineers prepare the riverbank for easy entry. Each first echelon regiment designates an assault battalion that, in turn, designates an assault company.

The assault company usually is reinforced by a platoon of amphibious tanks, an anti-tank gun, a squad of engineers, and a NBC reconnaissance squad. The company utilizes its amphibious fighting vehicles to cross the river in one wave. The remainder of the assault battalion then crosses behind the assault company.

Assault companies load into amphibious personnel carriers in their assembly areas, move to the riverbank, and cross directly behind the amphibious tanks during the artillery preparation. The artillery preparation, if any, usually lasts about 10—15 minutes, and is fired while the amphibious vehicles are moving up to the riverbank or as the vehicles enter the water and begin crossing the river.

On reaching the far bank, the company dismounts and attacks defensive positions that can place direct fires on the river. Ferry vehicles return to the near bank to transport across heavier equipment. Landing points are prepared for other units that are following. The remainder of the assault battalion then crosses and attacks to enlarge the bridgehead.

When the first elements of the assault company reach the far bank, engineer units assemble more ferries and ponton bridges on the near bank. Heavy equipment can usually begin crossing in about 2-3 hours. With heavy equipment across, the first echelon regiments attack to deepen the bridgehead and to secure the crossing for the rest of the division.

Construction of a heavy ferry or ponton bridge for the division's heavier equipment is begun when direct fires into the site are eliminated or suppressed. Divisions usually cross the river in less than 8 hours after the crossing operation starts. The division objective will be the same as in normal operations; the river is considered an obstacle—not an objective. The divisions immediately deepen the bridgehead to at least 10—15 kilometers. The army's second echelon crosses the river when the first echelon divisions break out of the bridgehead. The army uses its second echelon forces to widen the bridgehead and to encircle and destroy defensive forces along the river to permit commitment of the tank division in an exploitation.

Deliberate Crossings

The enemy undertakes deliberate river crossing operations only when hasty river crossings fail or are not possible. The deliberate crossing is carried out in a manner similar to the hasty crossing; however, more detailed planning, reconnaissance, and preparation are involved. Centralized control of the crossing is exercised at army level and nuclear fire support may be used. Closely controlled crossings are made on a broad front.

Thorough reconnaissance and assembly and equipping of forces are accomplished during the preparatory phase. Every intelligence means available is used to obtain complete information about the enemy. Units are reinforced in the same manner as for a hasty crossing. A combined arms army usually conducts a deliberate crossing with up to three divisions in the first echelon. Divisions cross with two regiments in their first echelon; these regiments cross with two battalions in their first echelon. The leading battalions cross in waves of reinforced companies.

First echelon battalions are moved into assembly areas under concealment of darkness or smoke about one and one-half kilometers from the river. Artillery is positioned to place fires throughout the enemy forward defenses. The actual assault crossing is usually made at night or just before dawn, preceded by artillery barrages and an intensive air preparation of up to two hours. The actual crossing is conducted in the same manner as a hasty river crossing.

To prevent opposing armor from overrunning bridgeheads, the enemy establishes antitank defenses as soon as the equipment has crossed the river. The division antitank artillery and engineer mobile obstacle detachments cross immediately after the first echelon regiments. Army antitank units may cross before second echelon divisions.

Helicopters are used for reconnaissance, to insert reconnaissance detachments across rivers, and to move engineers and equipment to ferry and bridge sites. Helicopters are also used to transport heliborne or airborne forces across river to attack defensive rear areas and to block defensive reserves entering the main battle area. Finally, helicopters can and will be used to provide fire support against defensive positions, particularly antitank positions.

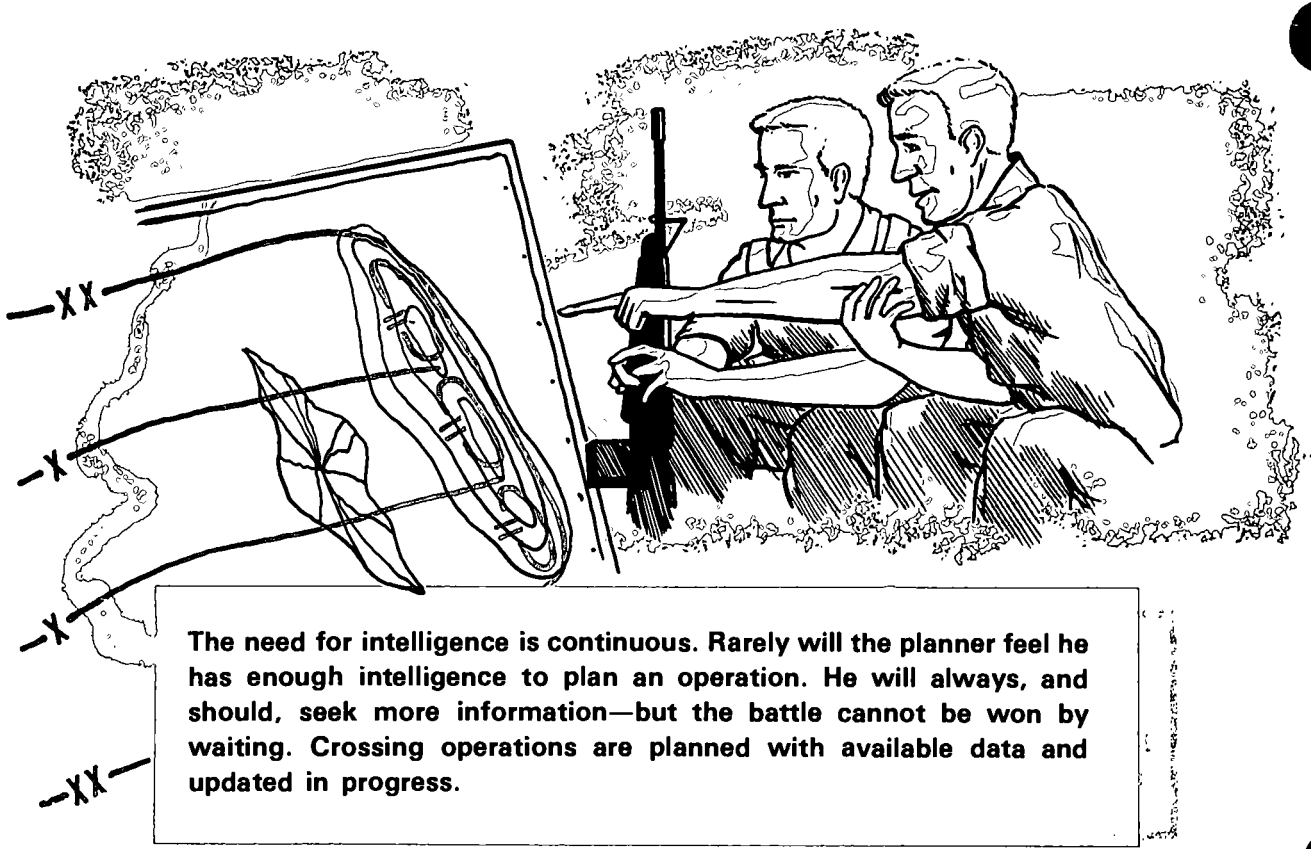
ESSENTIAL INFORMATION FOR THE CROSSING COMMANDER

The intelligence necessary to conduct a successful river crossing operation is situation-dependent. The effects of terrain and of enemy capabilities are interrelated, making a complete list of essential elements of intelligence impossible. Some of the obvious items of interest include information of the enemy's:

- Strength, composition, and disposition.
- Conventional, nuclear, and chemical capabilities.
- Previous tactics of defending/securing water obstacles.
- Intelligence system effectiveness.
- Use and effectiveness of electronic warfare.
- Ability to reinforce with maneuver, artillery, or air assets.
- Susceptibility to deception operations.
- Time required to prepare the defense and battlefield mobility for shifting or concentrating forces and fires.

The enemy's use of terrain and artillery is studied to determine:

- Whether the enemy is capable of defending forward, on, or beyond the river.
- Defensible positions/areas that can bring fire on the approaches, crossing sites, or exit bank.
- Probable location, type, and extent of enemy-emplaced obstacles.
- Positioning, command/control, and effectiveness of artillery.



The need for intelligence is continuous. Rarely will the planner feel he has enough intelligence to plan an operation. He will always, and should, seek more information—but the battle cannot be won by waiting. Crossing operations are planned with available data and updated in progress.

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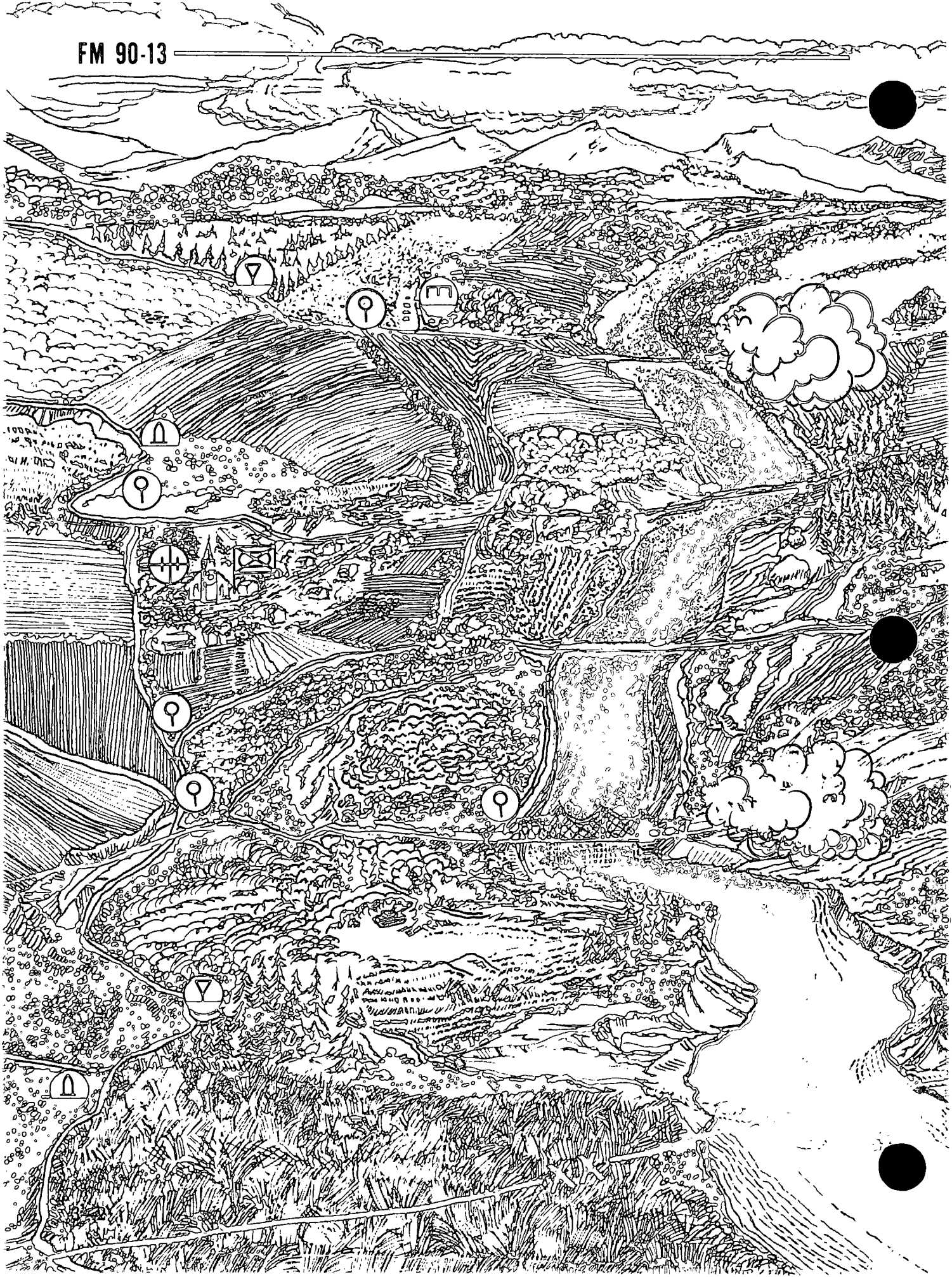
CHAPTER 3

offensive crossings

Crossing a water obstacle with overwhelming combat power to accomplish the mission is the goal of an offensive river crossing. The obstacle or the enemy may cause a loss of momentum, thus preventing a **hasty** crossing. A **deliberate** crossing must then be made. This chapter describes the planning, sequence of operations, and control measures necessary to execute a division-size deliberate offensive crossing.

To be effective, planning must be continuous at all levels of command. Wherever military forces encounter rivers, planning, however brief, is needed to project effective combat power across obstacles.



PLANNING

Long-range planning is conducted at corps and higher echelons. Detailed planning is necessary to insure that the crossing force succeeds. For deliberate crossings,early decisions on logistic support requirements are particularly important. Planning may be for crossings anticipated in the next few weeks or months, depending on the severity of the obstacle and an assessment of the enemy's overall capabilities.

Short-range plans are conceived at division and lower echelons. They may begin a few weeks or several days in advance of the anticipated crossings. Standard operating procedures (SOPs), training, and experience reduce the required planning time. However, the tactical situation may dictate that a plan be developed within a few days or several hours. To exploit opportunities in battle, units anticipate crossings, gather information, and develop crossing concepts that can be implemented quickly.

Corps normally plans and conducts crossings involving two or more divisions, or when requirements significantly exceed one division's capability. Most crossings will have engineer and traffic control requirements exceeding division resources. If the division can absorb necessary corps support elements and provide command and control, the crossing is planned and executed as a division operation.

In either event, all levels conduct planning. For a division operation, corps provides long-range intelligence of the enemy and the obstacle, anticipates support requests, and specifies the mission. For corps crossings, lower echelons analyze requirements against assets, provide current battlefield intelligence, and plan respective portions of the overall operation.

Intelligence of the enemy and terrain determines tactical and materiel requirements for the crossing and the command echelon capable of accomplishment. The "capable echelon" (e.g., division) becomes the crossing force and is the responsible planning headquarters. Corps, in its mission statement to a division, may specify the requirement to conduct a river crossing; or in assigning a mission, imply the task of crossing a river.

CORPS

Long range — overall battlefield plans

DIVISION

Short range — detailed plans

COMMANDER'S CONCEPT OF THE OPERATION

The division commander, knowledgeable of the enemy, terrain, and engineer support available, receives the corps mission and guidance and begins to formulate his concept of the river crossing operation. Based on his present information the division commander conceives either a *hasty* or *deliberate* attack plan. Once the commander presents his concept to the staff, he knows that additional planning and information concerning the enemy and the river may alter his initial plan.

To support his attack, the division commander also specifies to the staff the type of crossing to be planned. He knows that a *hasty crossing* is desired. But, if a delay at the riverline must be made because of the

requirements for additional planning, build-up of engineer equipment and support, or other preparations, then a *deliberate crossing* must be made.

Considering the elements of speed and surprise and the division's vulnerability to enemy artillery fire and air attacks, the commander should also specify whether the crossing is to be conducted at *night* or under reduced visibility conditions. At the same time and for the same reasons, the commander also states his desire for the crossing to be over a *broad* or *narrow front.* Crossing over a broad front permits a more rapid crossing of the entire force and reduces the overall vulnerability of his attacking force.

COMMAND AND CONTROL

A crossing force commander is designated to plan and control the river crossing operation. In a division crossing, the commander may assume that position, or more likely, he may designate his assistant division commander (ADC) for maneuver. This will allow the division commander to *command* all aspects of the division's operations. The crossing force commander then has overall *control* of the river crossing operation.

The crossing force commander is assisted by a crossing force headquarters in which the following staff elements are represented:

- Operations/Area Security.
- Engineers.
- Movement and Traffic Control.
- Communications and Electronics.
- Logistics.

The crossing force headquarters may be formed within the division main CP or as an *adhoc* staff formed and located adjacent to the main CP. It's important that the crossing force headquarters work closely with the division's day-to-day planners. Although manning of the staff elements is primarily from the division staff, manning may be augmented from corps. For example, the commander of the supporting engineer group or brigade should be designated as the *Crossing Force Engineer.*

In division operations, brigades are the assault forces. When the assault is conducted with two brigades forward, then two brigade zones are designated within the crossing front. These zones coincide with crossing areas of which one is designated for each assault brigade. Assault force commanders, usually brigade commanders, *command* the assault forces. When these units enter the crossing area, *control,* not command, is then passed to the crossing area commanders (CACs). Control then reverts back to the assault force commanders as the assault forces leave the crossing area.

Each crossing area commander controls:

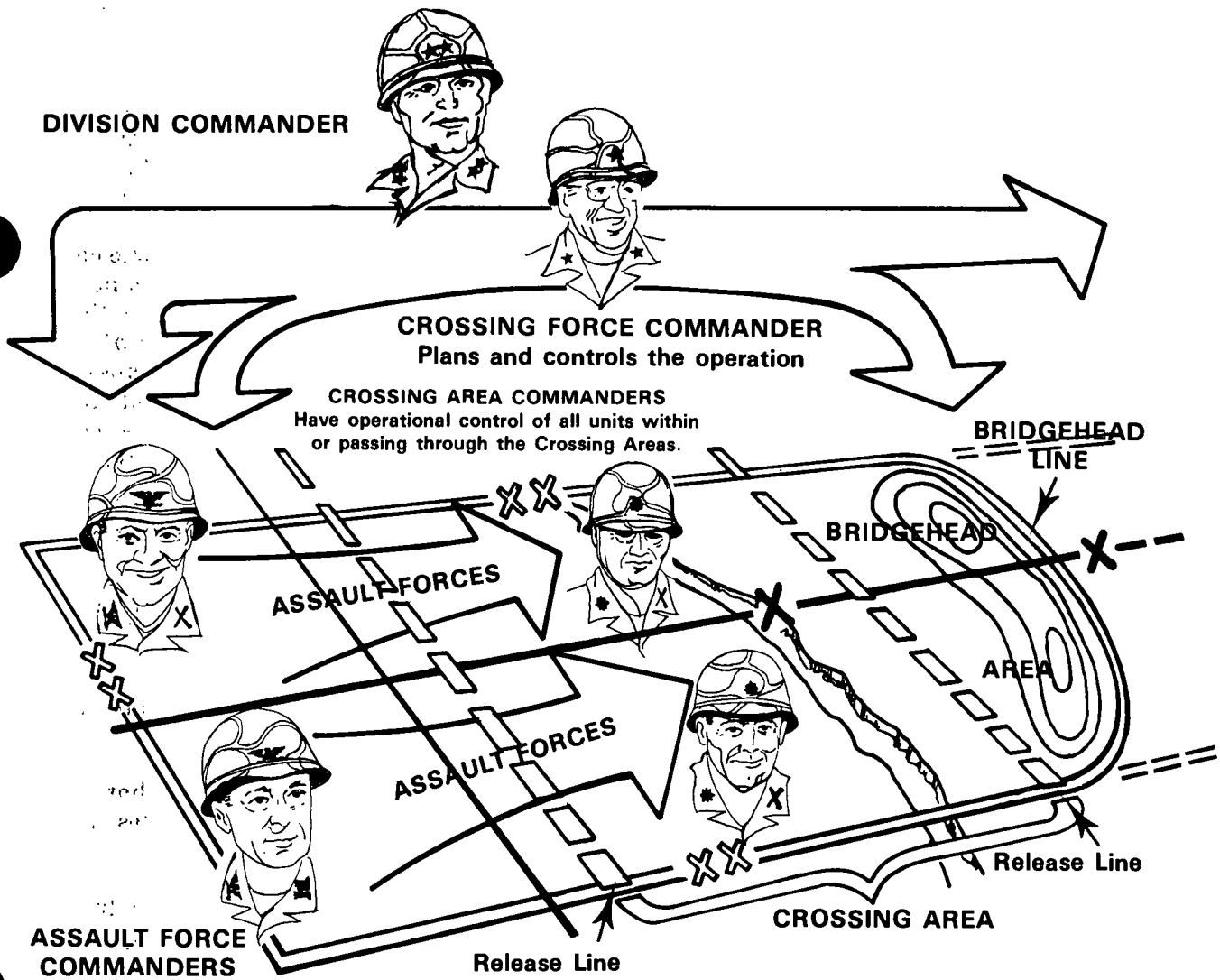
- Crossing units of the assault force while in the crossing area.
- Tactical elements that secure the crossing sites.
- Support forces—engineers that develop and maintain crossing sites and traffic.
- Control elements, primarily military police, that direct and control crossing units in the crossing area.

The designated crossing area commanders may be division or brigade staff officers. Since the assault force is normally a brigade, the brigade XO is usually designated as a crossing area commander. This allows the brigade (assault force) commander to focus his attention on the battle and serves to bind together the assault crossing and tactical concept. However, there are situations which favor appointing division staff officers as crossing area commanders to provide more centralized control.

Situations Favoring Appointment of Division Staff Officers:

- Crossings on a very restrictive and narrow front.
- Limited availability of bridging and site development equipment.
- Large or swift moving water obstacle and/or well-developed enemy defenses that require centralized control.
- Two or more brigades using the same crossing sites or means.

COMMAND AND CONTROL



REVERSE PLANNING

The crossing force commander facilitates planning by dividing the operation into distinct and manageable segments:

- Advance to the river.
- Assault crossing of the river.
- Advance from the exit bank.
- Securing the bridgehead.

These segments are distinct only while planning; during execution there is no planned pause between them since the overall operation proceeds as a continuation of the attack.

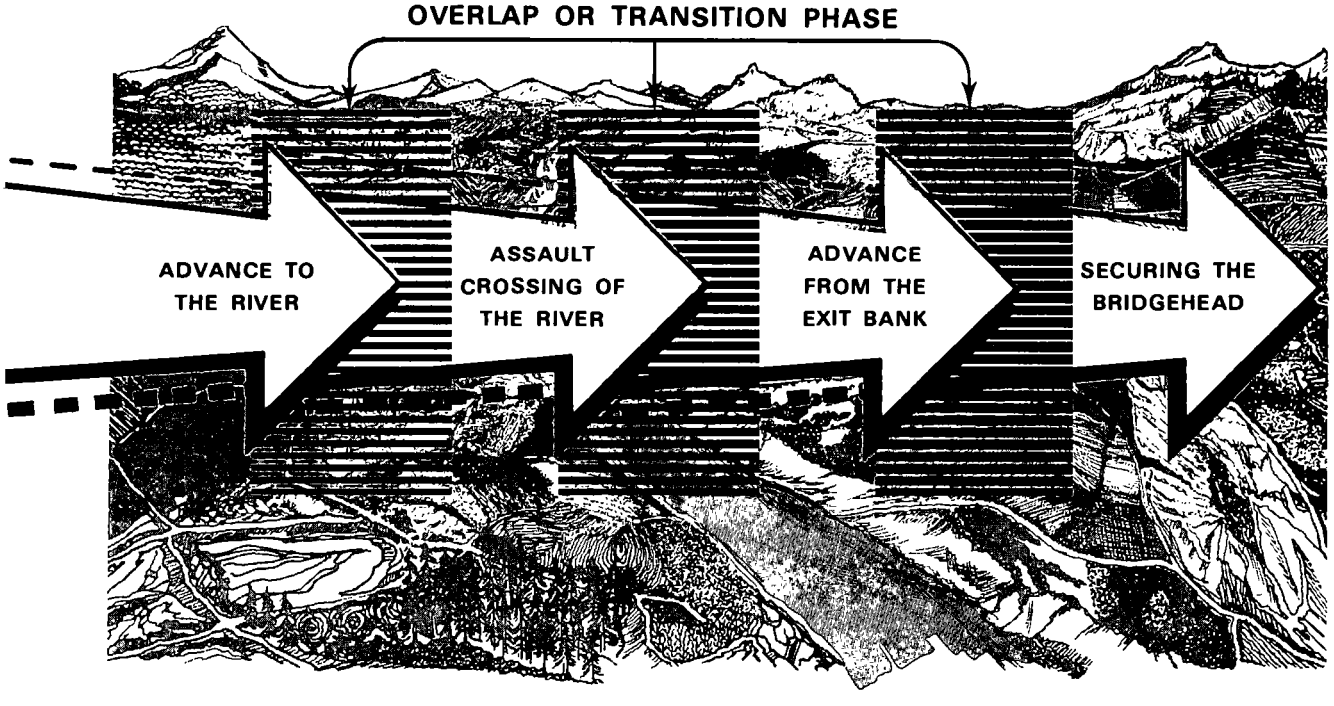
The planning sequence is considered in reverse order of occurrence (i.e., the last task of securing the bridgehead is examined first). However, the river is examined before the plans for securing the bridgehead and advancing from the exit bank are completed.

The crossing force and crossing area headquarters begin their planning using the commander's guidance. At the same time, the crossing force and crossing area engineers also begin their planning, as do the movement and traffic control planners. But as information and plans are assembled, they must be put together in reverse order and as shown in appendix D, River Crossing Planning Schematic.

The general planning requirements for river crossings vary little from routine offensive planning:

- Objectives are selected and assigned.
- Areas or zones for forces are determined.
- Control headquarters are designated, forces are allocated, and missions are assigned.

Assault crossing plans may be completed at crossing force headquarters level or delegated to the assault force and



PLANNING SEGMENTS

crossing area commanders once attack zones and crossing areas have been specified. To maintain the speed of the advance without loss of momentum, plans for hasty crossings are often accomplished at the brigade or assault force level. On the other hand, plans for deliberate crossings requiring more time and build-up of combat power are normally division or corps responsibilities. Complete plans prepared at division and corps require detailed coordination with brigades to insure that the sequencing of units at the crossing sites complements the brigade's assault concept.

When the crossing force headquarters delegates planning for the assault crossing, guidance and support are provided to the assault force and crossing area commanders. Guidance may include:

- Time of the attack and/or assault crossing of the river.
- Specific crossing sites.
- Times that bridges are scheduled for use by forces other than the assaulting brigade.
- Available crossing support forces (e.g., engineer and military police).

To prepare complete plans at brigade level, staff assistance may be required when planning engineer and traffic control requirements.

SECURING THE BRIDGEHEAD

The planning headquarters first reviews the objective area. Unless a bridgehead has been specified by higher headquarters, the crossing force determines what area or objective(s) must be controlled to insure the force's security and simultaneously facilitate future operations to defeat the enemy. Seldom is it necessary to specify a bridgehead to a corps or division. Usually, terrain or communication center objectives are assigned, or the crossing force is simply tasked to secure a bridgehead over a specific river. The crossing force selects the bridgehead.

AREA

Securing the bridgehead requires control of an area on the exit bank which is large enough to accommodate the assault and essential support elements of the crossing force. There are circumstances that may increase the size of the bridgehead beyond that required for the crossing force. For example, future operations may envision passing an equal size unit through the crossing force. More terrain is needed on the exit bank to insure a rapid passage of lines. In addition to accommodating the

BRIDGEHEAD AREA

Size determined by crossing force.

Contains bridgehead objectives.

Usually contains assigned objectives.

Delineated by bridgehead line.

crossing force and facilitating future operations, the size of the bridgehead may be determined by the defensive characteristics of the terrain. Not only must the enemy be defeated in the bridgehead, but also he must be prevented from effectively counterattacking the crossing force and/or destroying the crossing sites once the bridgehead has been secured. Therefore, defensible terrain and space within the bridgehead are required to conduct an active defense against an enemy counterattacking to regain control of the river bank.

The bridgehead, once selected, is graphically depicted by a bridgehead line that defines the outer limit of the area. Normally this line is located along identifiable terrain features, including crossing force objectives, and is connected to the river bank on the left and right flank of the crossing front. This arc orients the crossing force to the flanks as well as to the front. Usually, terrain or communications center objectives assigned by higher headquarters are within the bridgehead. If not, the attack proceeds from the bridgehead to secure these objectives. In either case, *once the bridgehead is secured, the river crossing operation is completed.*

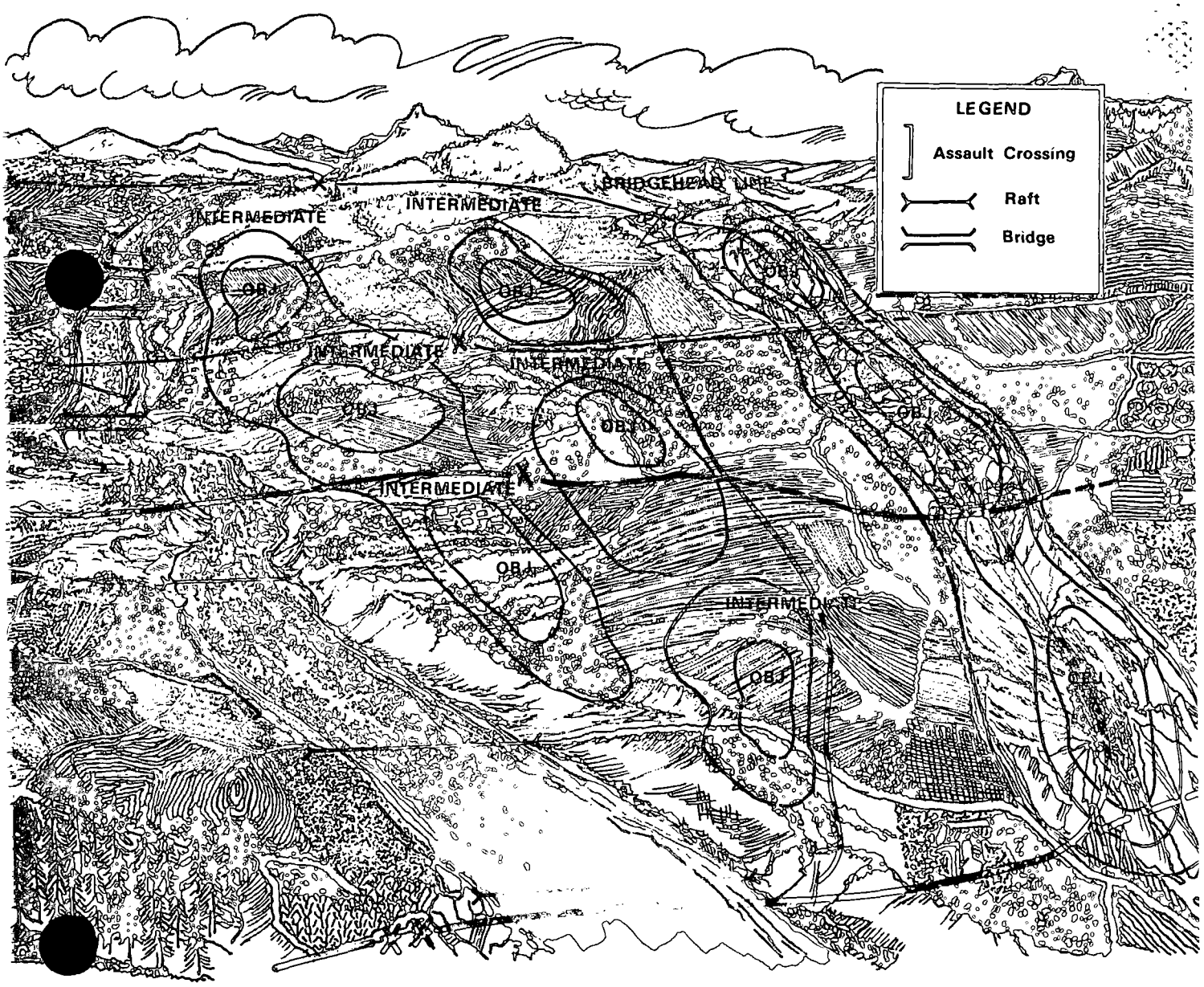
OBJECTIVES

To secure the bridgehead, objectives within this area are assigned to assault forces. Considerations for selection of objectives and the relative size forces to secure them do not vary from usual offensive operations. Ideally, objectives are attainable by the assault forces in one continuous attack from the river. The crossing force commander specifies only those objectives which must be controlled to secure the bridgehead. When terrain or enemy conditions warrant, intermediate objectives are assigned; however, judgment is required to avoid unnecessary slowing of assault forces. Plans must provide for a rate of crossing and build-up of combat power, combat support, and combat service support forces on the exit bank that exceeds the rate at which the enemy can concentrate against the crossing force.

Whenever possible, assault forces advance directly from the exit bank to bridgehead objectives. When intermediate objectives have been assigned, they are secured with minimum delay en route to final or bridgehead objectives. When intermediate objectives have not been specified by division or higher commands, the assault force commander selects objectives required to facilitate operations. At lower command levels (brigade) intermediate objectives are appropriate. For example, it is difficult for the lead battalion or company of an assault force to attack continuously without securing intermediate objectives, except when advancing against weak enemy forces.

Intermediate objectives serve several purposes:

- Orient the direction of attack toward final objectives.
- Provide centralized control of the advance.
- Facilitate changes in lead companies/battalions of the assault.
- Gain an initial foothold on the exit bank when stubborn enemy resistance is expected.



Determining where and what intermediate objectives to select is dependent upon terrain and enemy defensive dispositions. In areas of relatively open or unrestrictive terrain or against a weak enemy, few intermediate objectives are needed. Where terrain is rugged or when enemy defensive positions have been prepared in depth, more objectives are appropriate. Possible objectives include hills, enemy positions, or control measures such as report lines and phase lines.

Differences in planning considerations between hasty and deliberate crossings in securing the bridgehead are minimal. Intermediate objectives are assigned less frequently in a hasty crossing. The speed of the attack, deriving from momentum generated before the crossing begins, capitalizes on the limited time available for the enemy to establish a coherent defense. In a deliberate crossing, more centralized control of the assets and areas in the bridgehead is required.

FORCES

The division's crossing force commander and his staff plan the river crossing operation with the following tactical concepts in mind:

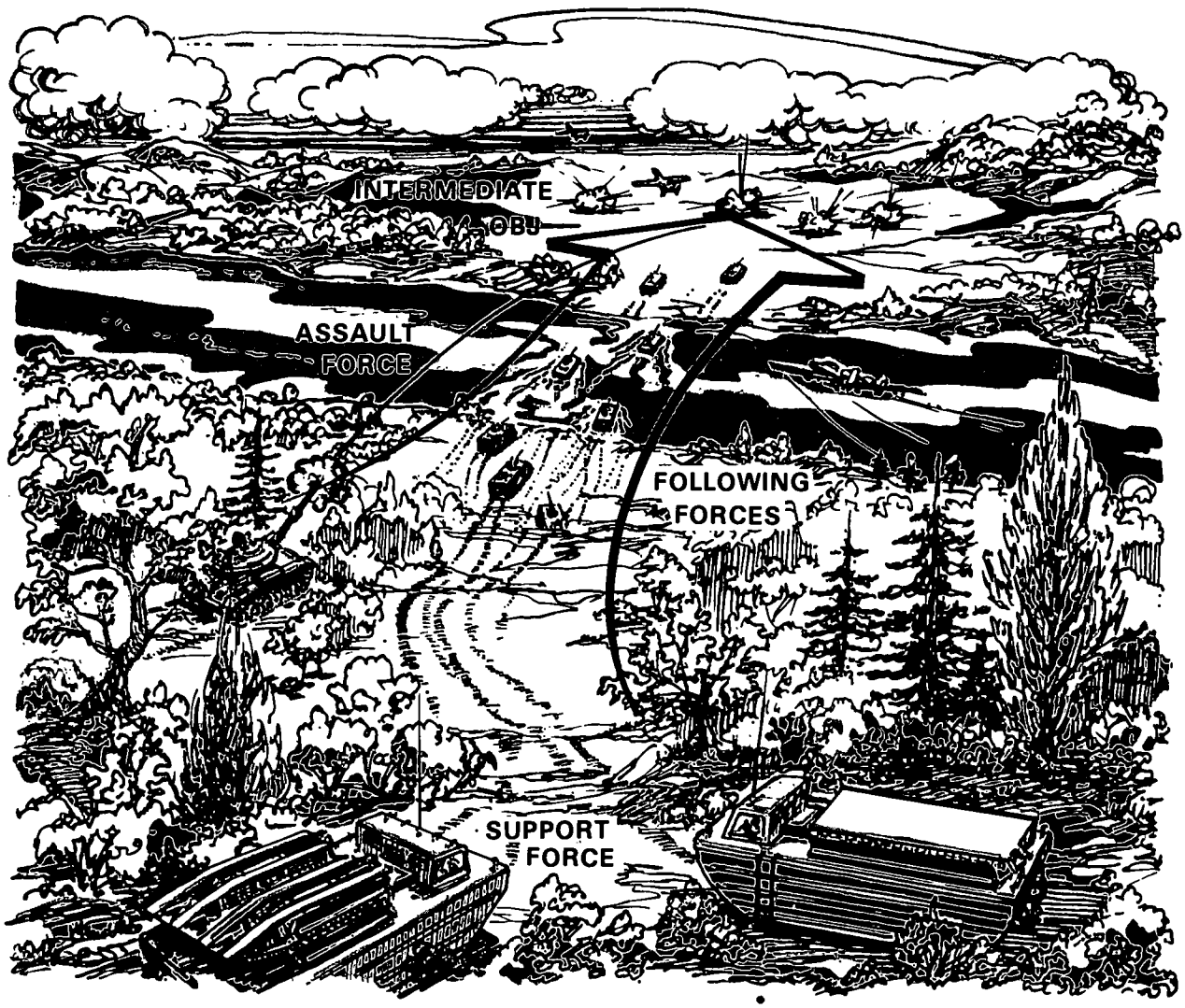
- Assault forces lead, making the initial assault of the river and continuing the advance from the exit bank to the final objectives.
- Follow-up forces provide overwatching direct and indirect fire support, crossing site security, and follow and support assistance to the assault force.
- Support forces develop crossing sites, emplace crossing means, control units moving into and away from the crossing sites, and assist the assault force to the objectives.
- Combat service support elements sustain the assault and subsequent advance to bridgehead objectives.

Leading brigade and battalion commanders envision their subordinate units in a similar functional grouping. Elements designated as follow-up, support, and service support analyze respective taskings to determine their task organization.

Assault forces close on the water obstacle and cross rapidly by any means available. Infantry elements establish local security on the exit bank to permit development of the crossing sites. Initial crossings may be limited to pneumatic assault boats and amphibious vehicles while tanks provide support from overwatch positions. Army aviation assets may lift assault forces over the obstacle in conjunction with the assault across the water. Tactical air and air defense artillery protect the crossing units and sites. Artillery fires and air strikes are effective in softening enemy resistance and may precede the assault with preparatory fires and/or a rolling barrage. Divisional engineers advance with lead elements to breach obstacles and open or improve trails to keep units moving. Tanks, using bridges or rafts installed by support forces, cross later in the assault.

Support forces accompany the assault forces and provide the necessary support to the crossing area commander. Engineers improve crossing sites and access and egress routes at crossing sites as rapidly as time and security permit. Rafts and bridges are installed to transport heavy loads. Military police and other designated crossing unit personnel control the flow of traffic to and away from crossing locations.

Follow-up forces move close behind assault forces to add their combat power where needed. Using rafts and bridges, they cross quickly behind assault elements where needed. They may overwatch assault elements, conduct follow and support tasks, or assume the mission of lead assault units. Artillery provides counterfires to protect the site, smoke to conceal the crossing, and fires in support of the lead assault elements. Air defense artillery protects the sites and pro-



vides an umbrella for Army aviation operations in the crossing area. Engineers develop overwatching and firing positions, then advance with the follow-up forces to reduce obstacles, improve by-passes, and install flank obstacles as required. Necessary maneuver, fire support and air defense elements secure crossing sites from guerrillas or local enemy counterattackers.

Combat service support sustains the attack. Decentralized and "prepackaged" support accompanies the lead elements when possible. Rearming, refueling, and maintenance points are established along advance routes to speed up servicing. The service support center or headquarters keeps clear of enemy artillery, if possible, and crosses after the follow-up forces.

The crossing force commander also considers the employment of airborne and/or air assault forces to secure terrain objectives in the bridgehead. Planning of an airdrop or air landings parallels the guidance contained in appropriate airborne/air assault manuals. The ground forces crossing the river have the mission to link-up with such forces and/or secure the bridgehead. Rarely will the sole use of an aerial envelopment provide sufficient combat power to secure a bridgehead. Careful analysis of the terrain, enemy dispositions, and suitable air avenues of approach into the bridgehead may provide the commander with opportunities to employ airborne or air assault forces and Army aviation assets.

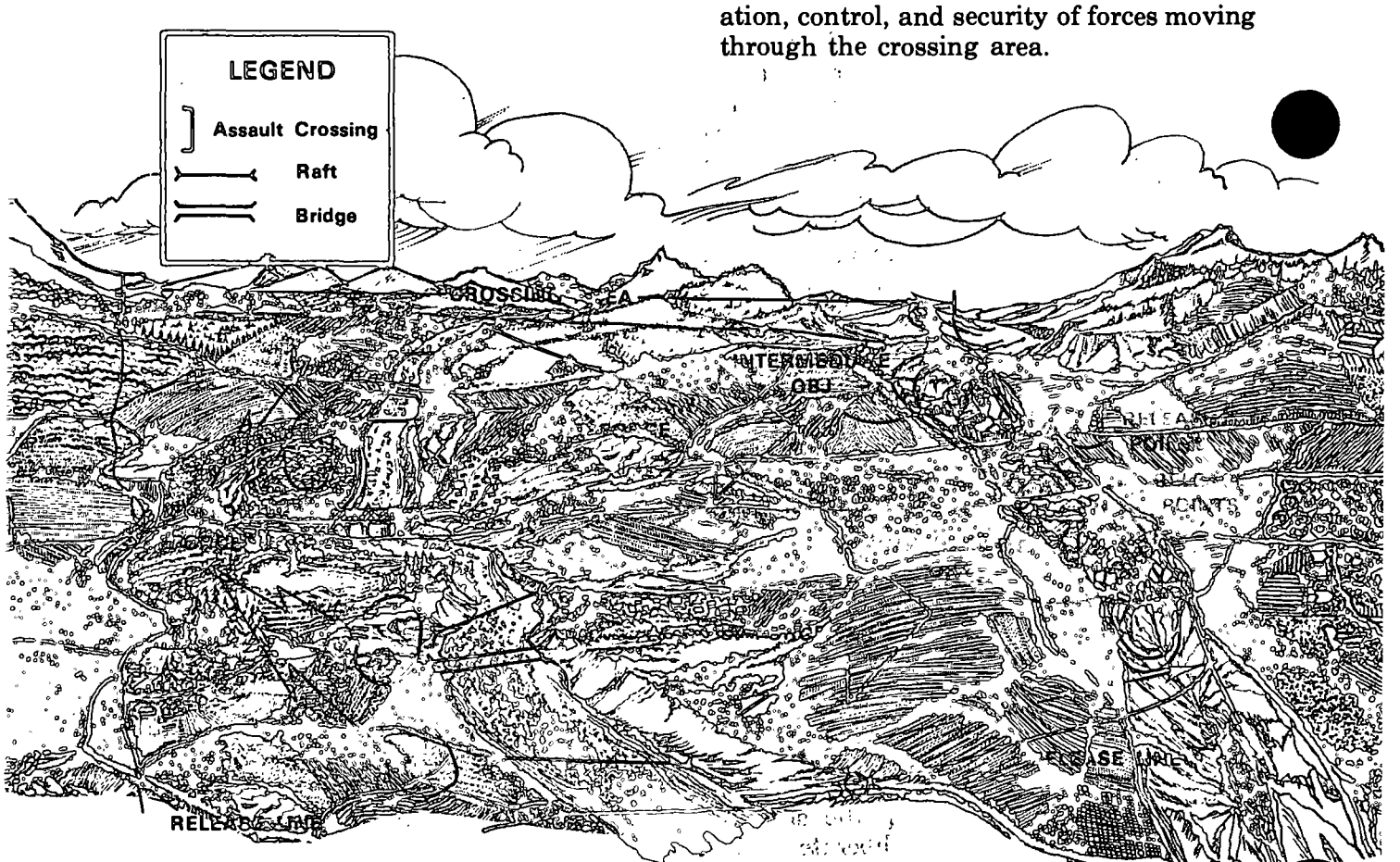
ADVANCE FROM THE EXIT BANK

Assault forces advance rapidly, without extensive reorganization, from crossing areas to objectives within the bridgehead. The enemy, given time, will attempt to halt the advance with strongpoint defenses, heavy artillery fires, and counterattacks. Therefore, comprehensive SOPs, detailed planning, and rapid execution enhance the probability of success.

RELEASE POINT/LINE

The advance from the exit bank extends from the release point/line to the bridgehead objectives. At the release point/line the crossing area commander relinquishes control of units to the assault force commander for continuation of the attack. The location of the release point/line is a function of terrain and expected battle *and* is mutually determined by the two commanders.

Release points/line may be located 2-3 km from the exit bank. This distance allows the assault force commanders to assemble their forces for continuation of the attack. Further, the clearance of this distance by follow-up and support forces, tank and artillery fire, under control of the crossing area commander, precludes direct fire on assault forces while they are still in the water. Release points (line when connected) are therefore located to facilitate the operation, control, and security of forces moving through the crossing area.



CROSSING AREA BOUNDARIES

TYPES OF ATTACKS

Offensive river crossings are not an objective in themselves, but a part of the scheme of maneuver and overall offensive action to defeat the enemy. The commander has two basic attack options to secure his objectives. Based on the assessment of the enemy, terrain, and the water obstacle, he may conduct either a **hasty** or **deliberate** attack.

The major concerns of the crossing and assault force commanders during any attack which includes a water obstacle are vulnerability of forces on the exit bank and a rapid advance to secure objectives. The latter is the overriding consideration; hence planning commences at the objectives and projects back toward the river. The principal considerations when selecting the size and composition of forces, attack formations, and advance routes are: objectives, other key terrain features, avenues of approach, and enemy defenses. An accurate assessment of the enemy's expected counterattacks and indirect fire barrages is integrated into planning. This is particularly significant during early stages of the advance because the assault force is temporarily divided by the river, thus diminishing its combat power potential. To counter probable enemy reactions, counterfires and aerial attacks augment other planned fires to insure the necessary rapid advance to overwhelm the enemy.

Offensive river crossings are not an objective in themselves, but a part of the scheme of maneuver and overall offensive action to defeat the enemy.

Hasty Attack. On contact with the enemy, the commander deploys his force, coordinating maneuver, fires, air support, and other means in an attempt to destroy the enemy in contact or develop the enemy situation sufficiently to determine what to do next.

Generally, if the leading assault elements cannot defeat, bypass, or fight through the enemy fairly quickly, the commander must decide whether to conduct a hasty attack or to develop the situation further, then conduct a deliberate attack. Intelligence available to the commander may indicate clearly which course he should follow. However, he might find it necessary to conduct a hasty attack to avoid the possibility of being unnecessarily delayed by inferior enemy forces. Thus, a hasty attack normally follows a hasty crossing.

Conduct of a hasty attack is a difficult and challenging operation. Ideally, there should be no pause in the forward momentum of the force after initial contact. Assault units swing into action, using movement techniques appropriate to enemy and terrain. The commander must summon and bring into the battle air defense and

field artillery, aerial fires of attack helicopters and USAF aircraft, and all other available support. He must coordinate and maneuver all his resources so that maximum combat power is applied against the enemy. The hasty attack must try to fix forward enemy elements in place with fire power, find gaps, weak spots, or open flanks, and move through them rapidly. *Speed is essential. If momentum is lost, the hasty attack will fail.*

Deliberate attack. When the commander of the crossing force determines that he has encountered a strong enemy force in well-prepared defensive positions, he may conclude that it will be necessary to conduct a deliberate attack. A deliberate attack is characterized by knowledge of enemy positions, by extensive preparation, greater volumes of effectively delivered supporting fires, by extensive deception, by full exploitation of EW, and by other measures beyond those possible in a hasty attack.

A deliberate attack aims at breakthrough on a narrow front, seeking penetration deep into the enemy's rear.

A deliberate attack envisions a continuous violent rupturing of enemy defenses—momentum is essential. Assault forces that are slowed give way to follow-up forces. The enemy's artillery and counterattacks are rendered ineffective by speed and momentum. Supporting artillery, engineer, and air defense elements accompany leading forces and may be attached if control by their parent units is impractical.

During the conduct of a deliberate attack the crossing force commander may "stack" assault forces (e.g., for division operations, brigades deploy in column on a narrow front to penetrate enemy defensive positions rapidly). Their attack continues until the lead assault force is slowed, at which time following forces attack through to renew the attack.

At lower levels the techniques are similar. Lead companies move rapidly to penetrate defenses. Enemy strong points are overrun or bypassed. Wide envelopments that delay the advance are avoided. Stalled companies hold the shoulders of penetrations open to assist follow-on companies or battalions in attacking through. Overrun and disorganized defenders are eliminated by "follow and support" elements.

In the advance to final objectives, close coordination within the combined arms team is essential. Artillery is organized to provide close and continuous support to leading assault units. Artillery displaces by echelons to deliver fires on the enemy in ever-increasing depth. Fires are planned on enemy strong points and likely counterattack positions. Suppressive fires degrade enemy air defenses and smoke provides a mask for friendly movement. Artillery-delivered scatterable mines protect flanks and block enemy movement.

Engineers also emplace scatterable mines and other obstacles on flanks and similar risk areas. The engineers' primary task is to overcome obstacles, enemy emplaced or natural, that slow the mobility of assaulting elements. They maneuver with lead elements and are task-organized to overcome terrain and enemy.

Air superiority must be gained over the bridgehead. Close air support augments artillery and blunts counterattacks. Air interdiction deeper into the bridgehead reduces the enemy's ability to react. Attack helicopters engage counterattacking tanks and destroy withdrawing enemy. Lift helicopters maneuver assault forces and supporting equipment behind enemy positions or to other locations where needed to strike the enemy's flanks. Forward area air defense artillery systems protect lead elements from enemy air attack.

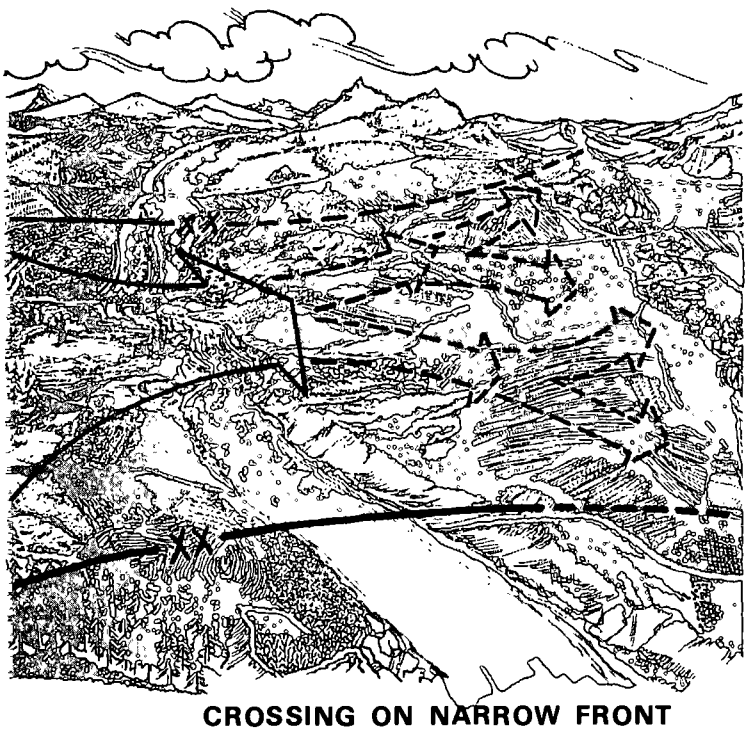
MANEUVER

The type of attack, hasty or deliberate, together with intelligence of the terrain and enemy defensive positions adjacent to the riverline, influences the size of crossing areas and number of sites selected. Enemy defenses near the exit bank of the river are to be expected; therefore, crossing areas/sites usually correspond to routes of advance from the exit bank.

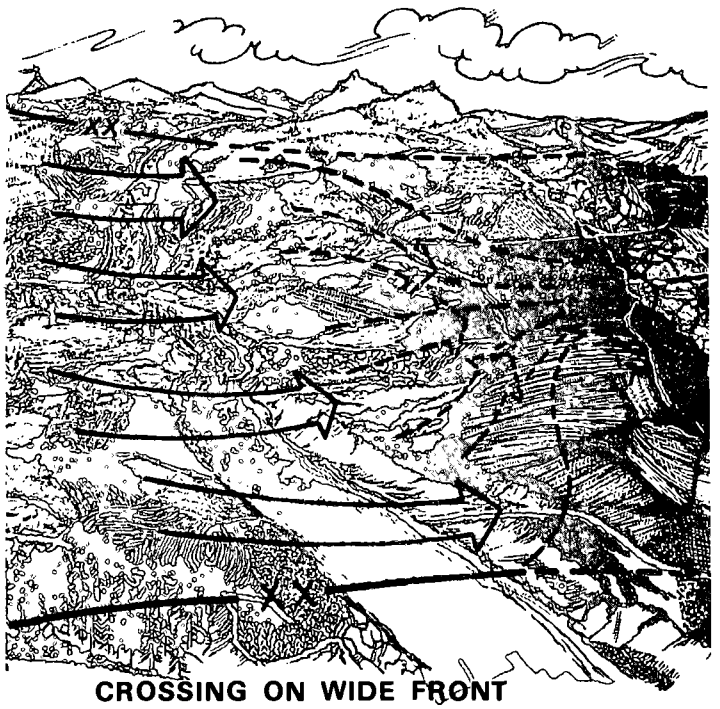
When access routes to or egress routes from the river are severely limited, an attack on a **narrow front** may be required. It may also be required because of the limited availability of engineer assets. Unfortunately, an attack on a narrow front requires considerable time to cross the river and is obviously more vulnerable to enemy fires and counterattacks. If the terrain and enemy situation permit, crossings may be made on a narrow front and forces dispersed on the exit bank to continue a hasty attack.

An attack on a **broad front** is preferred over an attack on a narrow front because it permits a more rapid crossing of the entire force and reduces the overall vulnerability of the attacking force. An attack on a broad front may cause the defender to delay committing his reserves until he evaluates the situation in all areas and determines which crossings most seriously threaten his defense. If the enemy delays too long in committing his reserves, the attacking force can develop enough combat power on the far bank to repel his counterattack. The situation may permit the assault forces to cross on a broad front, then concentrate on the exit bank for a deliberate attack. The major differences between the two crossing techniques in the task of "assault crossing of the river" are in the detail of the plan and the degree of control.

To this point in the detailed planning, it has not been determined whether the



CROSSING ON NARROW FRONT
DISPERSAL OF FORCES ON EXIT BANK



CROSSING ON WIDE FRONT
CONCENTRATION OF FORCES ON EXIT BANK

crossing can be hasty or deliberate. The major differences between the two operations during the "advance from the exit bank" are the arrival rate and composition of forces. Hasty crossings usually do not require clearing of enemy forces on the entry or exit bank, thus crossing elements need not arrive on the exit bank in a strictly controlled or prescribed sequence. The major differences between the two crossing techniques in the task of "assault crossing of the river" are in the detail of the plan and the degree of control.

In a *hasty crossing,* time and enemy activity may preclude physical reconnaissance of the crossing sites prior to the river assault. The crossing schedule may only detail designated crossing times for battalions, rather than extending the schedule to company level and below. Control is decentralized as low as possible. The CAC controls overall movement; however, fewer control measures are designated. These comments are not to be interpreted that the hasty crossing is unplanned and without control. It must by *planned* and *controlled.* The degree of detail varies—even among hasty crossings.

Enemy defenses near exits are carefully studied to determine their influence on subsequent advances. When it can be determined that enemy resistance may preclude or effectively delay the advance, then enemy forces on either bank must be neutralized or forced to withdraw. The commander must decide: "Can I get the necessary forces to the right place at the right time during a hasty crossing? Or are enemy dispositions, the nature of the terrain, obstacles, and friendly forces immediately available such that a deliberate build-up of combat power and neutralization of enemy on the river banks is required first?" He weighs these considerations against the time required to concentrate—keeping in mind that additional time enables the enemy to develop stronger defenses.

The commander and his staff continue the detailed planning process and review the assault crossing of the river to determine the ability of building up combat power on the exit bank.

ASSAULT CROSSING OF THE RIVER

Plans must provide for projecting combat power across the water obstacles at a rate greater than the enemy's ability to concentrate against the crossing force.

This task distinguishes river crossings from other offensive operations. It requires careful planning, timing, and execution in a sequence that causes minimal interference in the advance to the river. And forces must cross as rapidly as possible with sufficient combat power to overwhelm the enemy.

CROSSING FRONT AND AREAS

The crossing force commander begins planning the assault crossing by designating attack zones within the crossing front. Boundaries between assault forces are selected to facilitate subsequent operations—that is, the advance from the exit bank, rather than the approach to the river.

In division operations, brigades are the assault forces, and attack zones coincide with crossing areas. In corps crossings, divisions are the assault forces, but retain

the authority to select crossing areas within attack zones assigned by corps. In both cases, division assigns each assault brigade a crossing area and designates crossing area commanders (CACs).

The size of the crossing area must be large enough to accommodate sufficient crossing sites, the assault force and essential follow-up and support forces. The depth of the crossing area has previously been specified as 2-3 km on either side of the river. Therefore, the width of the crossing area along the river must be adjusted to fit the situation.

CROSSING AREA STAFF AND FORCE

Assault force and crossing area commanders and their staffs *must* plan together. Preferably, they jointly develop the portion of the river crossing plan/operation that pertains to the assault crossing of the river. They determine crossing sites, a unit crossing schedule, and traffic movement plans for either bank to insure a continuous and ever-increasing flow of advancing assault forces. They collect data and examine tasks directed by the crossing force headquarters for incorporation into the assault crossing plan. Jointly they determine a point in time or space when the CAC assumes control of units in the area.

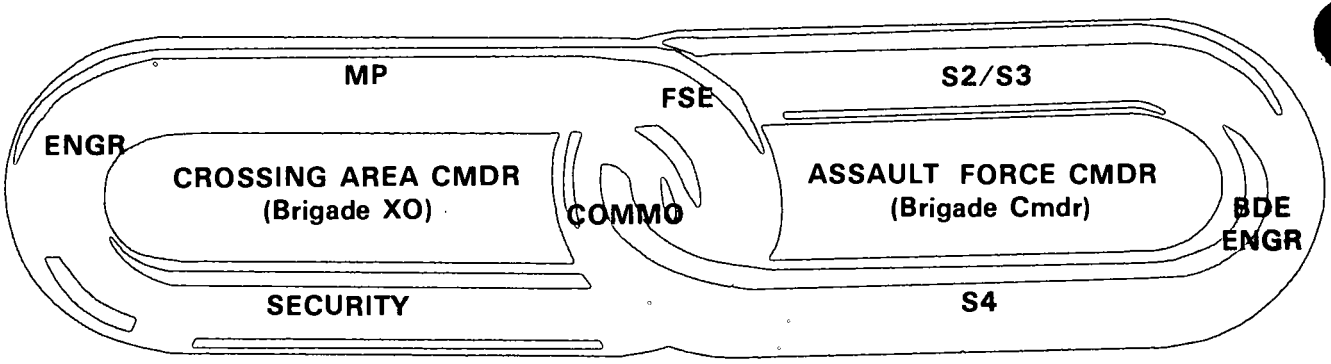
The crossing area commander needs secure crossing sites to cross as many vehicles as possible during the least amount of time. He is concerned with the battle but more interested in crossing units.

He can maximize use of crossing sites when:

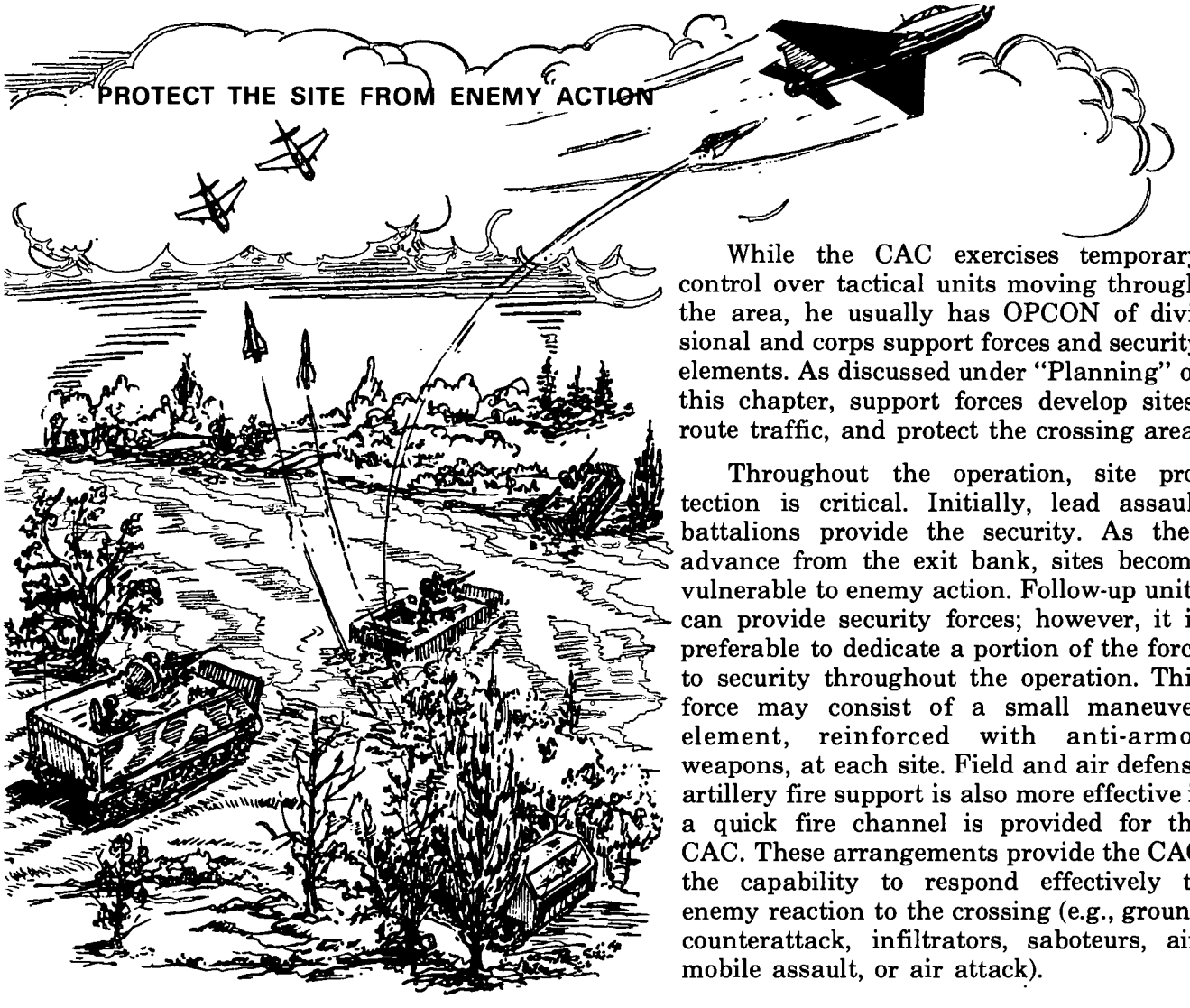
- **Bridges are used rather than rafts.**
- **"Pure" units cross rather than combat task forces with a mix of different vehicles and equipment.**
- **Vehicles and units are readily available and waiting to be crossed.**
- **Crossings are conducted in daylight.**

Conversely, the assault force commander orients on securing objectives and is more concerned with fighting the enemy than in maximizing crossings. He wants units task-organized with sufficient service support elements positioned in the rear. His concept envisions units fighting to the river's edge and from the exit bank without being slowed in assembly areas. He knows survivability while crossing is enhanced by smoke and/or darkness.

To execute an effective crossing the two preceding concepts are welded into one. Commanders and their staff require detailed intelligence of the water obstacles to develop a plan that minimizes the limitations imposed by terrain, the water obstacle, and the crossing equipment capabilities.



The CAC operates from a headquarters where he can control the crossing. This may be located with the assaulting brigade main or TAC CP. He usually coordinates supporting engineer, military police, and security forces by face-to-face contact. When located with the brigade TOC, he can directly coordinate maneuver and logistics requirements with the brigade S3 and S4.



While the CAC exercises temporary control over tactical units moving through the area, he usually has OPCON of divisional and corps support forces and security elements. As discussed under "Planning" of this chapter, support forces develop sites, route traffic, and protect the crossing area.

Throughout the operation, site protection is critical. Initially, lead assault battalions provide the security. As they advance from the exit bank, sites become vulnerable to enemy action. Follow-up units can provide security forces; however, it is preferable to dedicate a portion of the force to security throughout the operation. This force may consist of a small maneuver element, reinforced with anti-armor weapons, at each site. Field and air defense artillery fire support is also more effective if a quick fire channel is provided for the CAC. These arrangements provide the CAC the capability to respond effectively to enemy reaction to the crossing (e.g., ground counterattack, infiltrators, saboteurs, air-mobile assault, or air attack).

CROSSING SITE SELECTION

River crossing planners weigh several considerations when selecting crossing sites:

Enemy Activity

- Can he bring fires on the site?
- How can his positions be neutralized?

Crossing Method

- Fording.
- Assault/swimming.
- Rafting.
- Bridging.

Physical Characteristics

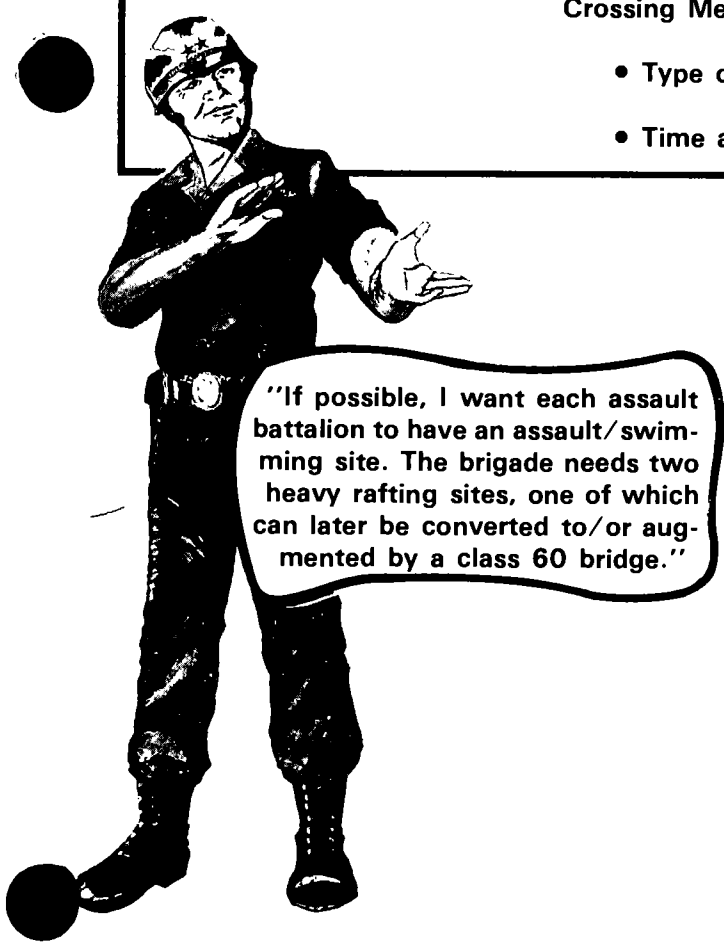
- River width, depth, velocity.
- Entry/exit routes.
- Obstacles.
- Cover/concealment.

Assault Concept

- Formation (line, column, echelon).
- Overwatching elements.
- Supporting fires.

Crossing Means Available

- Type of equipment.
- Time and assets.



The intelligence requirements outlined in chapter 2 are augmented by physical characteristics of desirable crossing sites detailed in appendix C.

Even though divisions assign crossing areas to brigades, they seldom specify crossing sites unless a certain location is critical to the tactical concept. Sites chosen to support leading assault brigades are coordinated between the crossing area commander and the assault units. Although tentative crossing sites may have been identified by the intelligence system, assault force commanders select exact locations with the assistance of their brigade engineers and assault battalion commanders. The crossing area commander influences the decision based on each site's physical characteristics, required engineer support, and available crossing means.

Assault battalions making the initial assault, or higher echelons visualizing battalion operations, apply the following site selection criteria:

- **First**, consideration is given to crossing locations or segments of the river that enhance the battalion and brigade advance from the exit bank.

Exit bank objectives are chosen to:

- **Secure the exit bank and protect remaining crossing elements of the battalion.**
- **Orient the assault battalion(s) toward intermediate or bridgehead objectives.**

How large an area and where the objectives should be are situation-dependent. Because of the river, the force is split and mobility is inhibited; therefore, objectives may be smaller and not as far from assault positions as usually envisioned during a deliberate attack. The requirement is to neutralize enemy forces that can place or direct fires on the crossing site exits. Once this is accomplished, further development and improvement of the exit bank will permit an increased rate of crossing.

- **Next**, the method and formation of the initial crossing is considered. Crossings unopposed by the enemy may be made by any number of methods: fording, assault/swimming, rafting, or bridging. Crossings which are opposed will initially require forces to cross by fording or assault/swimming.

Lead elements may have to cross under enemy fire while follow-up forces provide overwatching direct and indirect suppressive fire. They may cross in a line or column formation. A line or wave formation utilizes several entry and exit points and crosses more forces than a column in equal time periods. However, it exposes more forces, increasing vulnerability and detection of the crossing effort. A column, using one or two entry points, concentrates forces but requires more time to build up combat power on the exit bank. It limits exposure during crossing but increases crossing time, providing the enemy more time to detect and concentrate fires on the crossing site.

Regardless of the method and formation used, engineer forces must cross early to reduce enemy obstacles and develop exit points on the far bank. They enhance the ability of amphibians by clearing paths, reducing slopes, and stabilizing banks. Engineers supporting the attack, usually

division engineers, advance with the assaulting unit, while those supporting the crossing area, predominantly corps engineers, continue the development of exit points. River banks at crossing sites may have low but steep sides that require grading. Most natural soil becomes unstable from heavy traffic and/or water carried onto the bank by amphibious or fording vehicles. Based on terrain intelligence and reconnaissance, engineers must stabilize the banks. The amount of effort varies with soil type, crossing method(s), and vehicle density.

- **Finally,** having considered requirements on the exit bank and techniques for initial crossings, attention is directed to locating suitable entry points. Natural conditions vary and entry banks may require little preparation, or they may be so restrictive that feasible sites are limited.

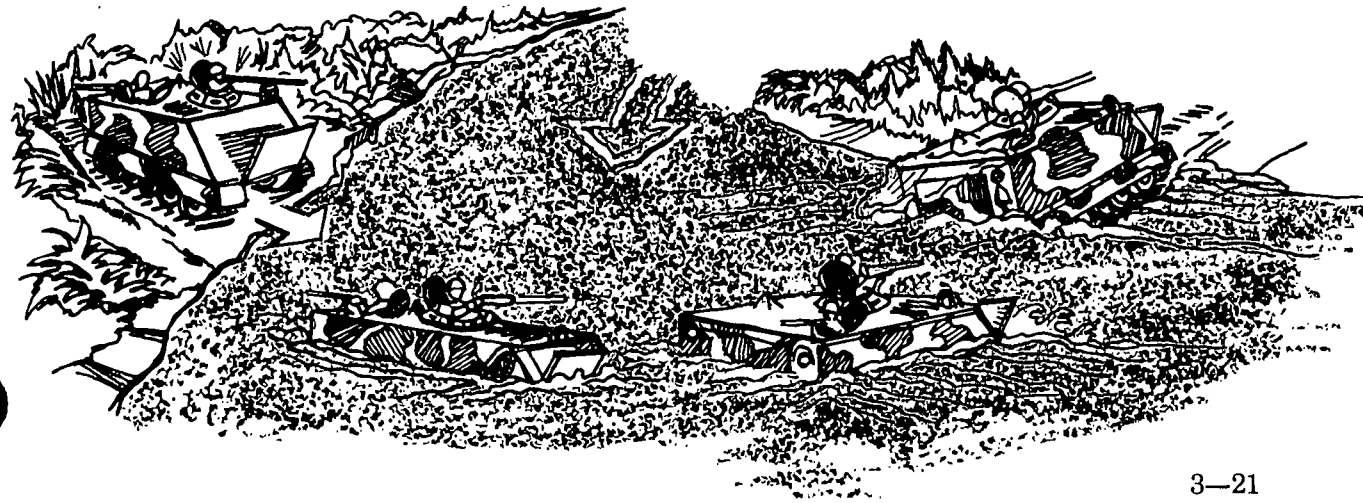
Desirable entry site characteristics include:

- **Minimum exposure to enemy direct fire weapons.**
- **Covered and concealed access to the river's edge.**
- **Gently sloping and firm banks, free of obstacles to permit rapid entry at multiple points.**

Initial and subsequent entry points may vary in location. Initial entry points may be chosen in less desirable crossing locations to avoid detection and gain surprise. Seldom are locations available that have all the desired qualities. Also, excellent physical crossing sites receive the defender's full attention. Planners often consider crossing at a less desirable site initially, moving laterally along the exit bank, and attacking the flank or rear of enemy forces defending better crossing locations.

Lead battalions secure the immediate areas around entry points and begin suppression of enemy direct fire. The areas need not be large, and suppressing all enemy fires is not necessary. Darkness and smoke provide obscuration.

The crossing method influences the operation techniques of lead assault elements. For example, infantry or other dismounted forces may initially cross using pneumatic assault boats. Plans are made to acquire or have ready the necessary boats. They must be inflated and crews oriented to desired landing points. Engineer boat crews brief assault force personnel to insure familiarity in boat operation and safety "do's and don'ts." Entry points are determined considering river velocity and width to permit rapid crossings to desired exits. Stronger currents require entry points further upstream. Attack positions are located near, but not on, the river bank; final preparations such as boat inflation and equipment checks, organization or crossing teams, and review of assigned missions are made at these locations.

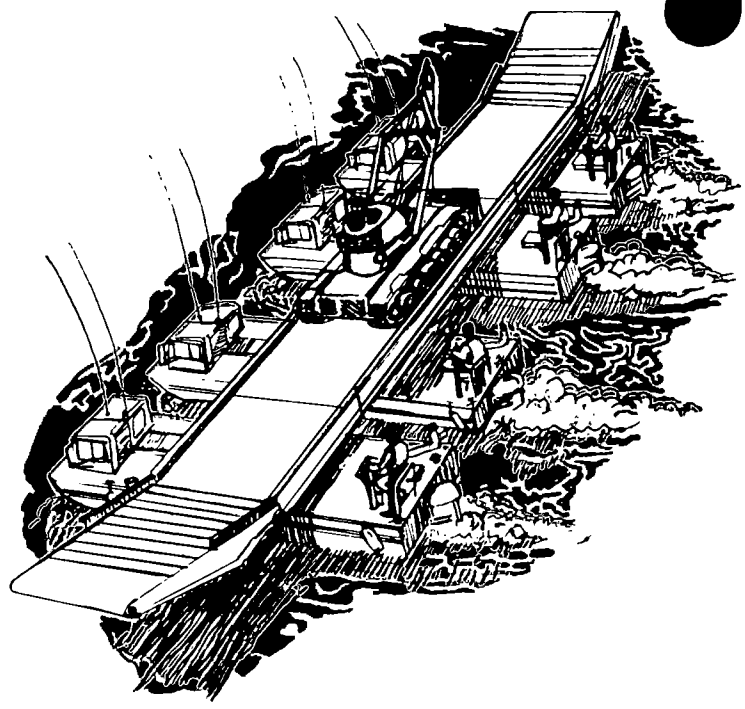


Regardless of the crossing method, initial crossing elements are protected by overwatching forces. Elements waiting to be crossed provide supporting fires and/or deceptive demonstrations to enhance the success of initial crossings. Subsequent crossing sites in better locations may be developed and used when early enemy resistance has been overcome. Sites served by good road nets on either bank speed up the operation.

As soon as possible, consistent with the tactical plan, tanks and heavy engineer equipment cross. Rafting is the most common means; however, they may be able to cross by fording up to four feet of water at carefully selected sites. River beds at fording sites must be firm and free of large rocks and other obstructions.

Heavy engineer equipment, such as dozers, universal engineer tractors (UETs), and combat engineer vehicles (CEVs), cross early to prepare and improve exit points. This equipment augments engineer troops that crossed with the initial assault wave and are equipped with hand tools only.

Whereas initial assault/swimming sites are oriented on close-in exit bank objectives and surprise, subsequent sites are selected to provide good access and egress to enhance mobility and the build-up of combat power on the exit bank. To achieve a faster crossing rate, more control of vehicles/units moving into the crossing area and awaiting crossing is necessary. Units or "vehicle packages" are identified for crossing at specified sites *and* at specific times. The assault battalion or assault force commander works closely with the crossing area commander to develop such a vehicle crossing plan.



CROSSING METHODS AND MEANS

Before finalizing command and control arrangements, planners review the common crossing methods and means available.

As stated earlier the basic methods include:

- **Fording**
- **Assault Boats**
- **Swimming**
- **Rafting**
- **Bridging**

The following is an overview. Consult appendices B and C for additional characteristics and **FM 90—13—1** for operating safety and training procedures.

All military combat vehicles are capable of fording shallow rivers with limited stream velocity and stable beds. Most vehicles are equipped with kits to increase fording depth capabilities. Stream velocities of less than 1.5 meters per second are preferred. Specific depth capabilities and required adaptations are contained in appropriate operator TMs.

FORDING

- **Personnel wading**
- **Vehicle**

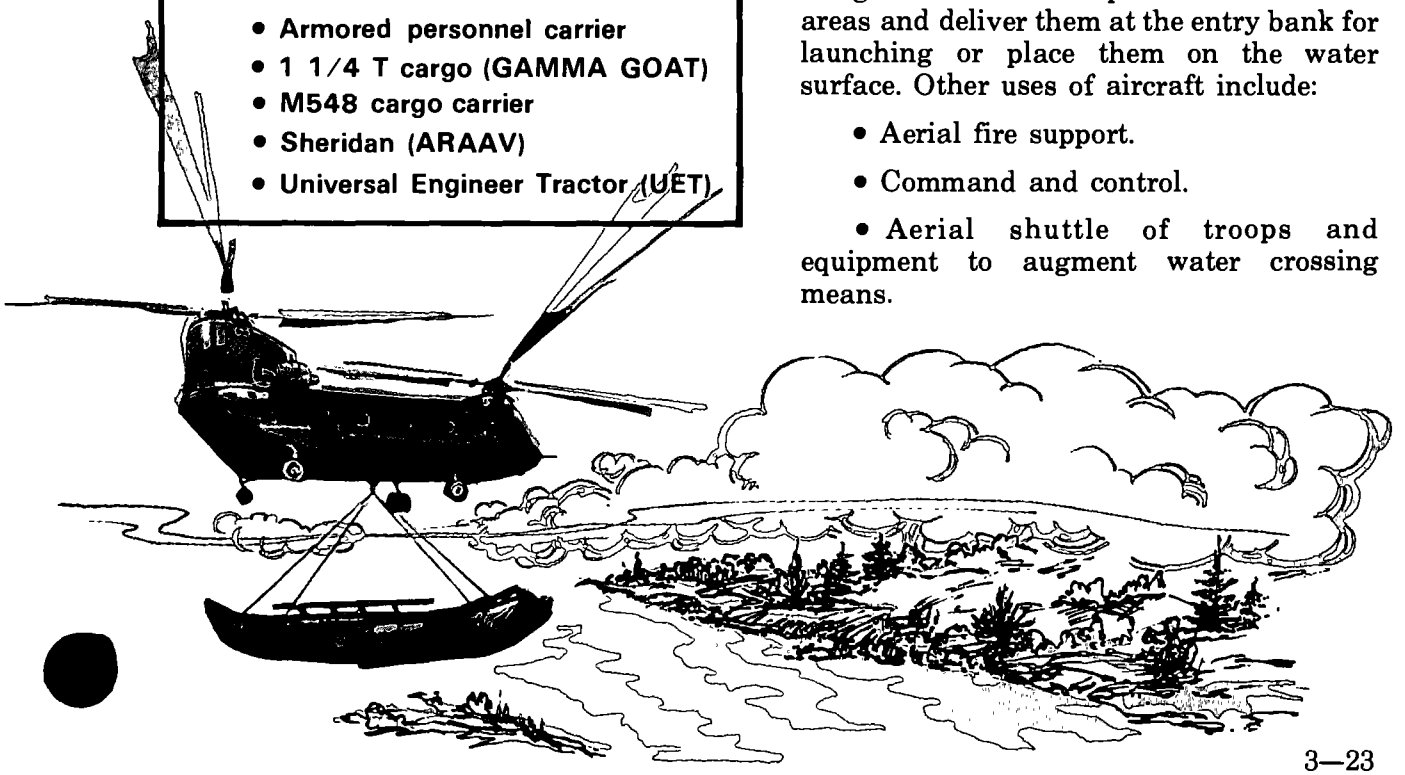
Each lead assault battalion should have at least one fording or assault/swimming site.

ASSAULT/SWIMMING

- **Aircraft**
- **Reconnaissance and pneumatic assault boats**
- **Vehicle**
  - **Armored personnel carrier**
  - **1 1/4 T cargo (GAMMA GOAT)**
  - **M548 cargo carrier**
  - **Sheridan (ARAAV)**
  - **Universal Engineer Tractor (UET)**

Army aircraft provide a unique capability to cross and support crossing operations. They may be used to transport reconnaissance teams, exit bank security, and work elements; or they may comprise the primary means for crossing assault elements and equipment to secure objectives. Helicopters can lift components of some bridges that have been preassembled in rear areas and deliver them at the entry bank for launching or place them on the water surface. Other uses of aircraft include:

- Aerial fire support.
- Command and control.
- Aerial shuttle of troops and equipment to augment water crossing means.



Reconnaissance and pneumatic assault boats have a major role in the early stages of the assault. Site selection and exit bank patrolling may be accomplished by personnel operating from 3-man reconnaissance boats or 15-man pneumatic assault boats.

Assault boats:

- Are primary crossing means for infantry or other dismounted forces.
- Carry 12 assault troops and a 3-man engineer crew.
- Augment crossing capability of amphibious vehicles, or provide a substitute capability when the condition of entry/exit banks preclude vehicular use.
- Have slower rate of crossing and are more vulnerable to enemy fires when compared with armored personnel carriers.
- May be used for silent crossings, feints, and patrols.

Amphibious vehicles are the primary means for initial crossings by a heavy division. Armored personnel carriers are preferred for assault elements, while unarmored amphibious vehicles transport supplies and equipment. Entry and exit points must be cleared of obstructions and have slopes consistent with the vehicle's capability. Each amphibious vehicle must be prepared and inspected before entering the water. Stream velocities of less than 1.5 meters per second are preferred, and downstream drifting should be calculated for currents in excess of 0.8 meters per second.

Light rafting augments other means during crossing operations. The six light tactical raft (LTR) sets organic to the corps float bridge company can carry loads up to class 16 (class 12 with articulators). When all sets are connected, they form an 80-meter, class 16 bridge. The 24 raft pontoons with outboard motors can serve as assault boats.

Heavy rafting transports the division's class 60 loads. The three type rafts: Mobile Assault Bridge (MAB), Ribbon, and M4T6 are components of bridge sets and are assembled in various configurations to support given loads. Specific planning factors are contained in appendix B; however, a general guide follows:

RAFTING		RAFT CONSTRUCTION		
		CLASS	MANPOWER	TIME
LIGHT	LIGHT TACTICAL RAFT (LTR)	CL 12/16	ENGINEER PLATOON	20—30 MIN
HEAVY	MOBILE ASSAULT BRIDGE (MAB) RAFT	CL 60	MAB CREW	10—15 MIN
	RIBBON BRIDGE RAFT	CL 60	RIBBON CREW	15—20 MIN
	M4T6 RAFT	CL 60	ENGINEER PLATOON	3 HOURS
FERRY	CAPTURED CIVILIAN OR ENEMY RAFTING			

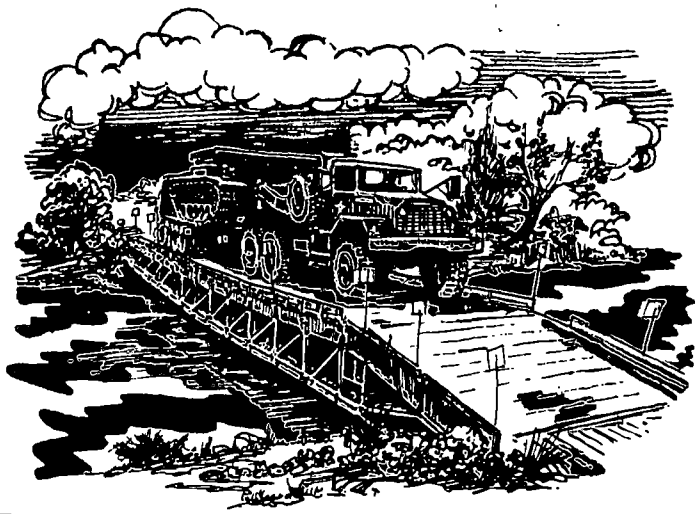
NOTE: For initial planning, each lead assault brigade should have two rafting sites. When tactical situation allows, one raft site can be converted or augmented to class 60 bridge site.

On wide unfordable rivers, rafts normally are the initial means for crossing tanks and heavy vehicles. Because of their size and mobility, rafts are less vulnerable than bridges to enemy fires. Crossings subject to enemy direct and observed fires require plans for dispersed rafting operations. Rafts alone cannot cross the required traffic volume. They are replaced or supplemented by bridging when enemy observed fires have been neutralized.

Because not all bridge types are in the current inventory, not all will be discussed. Research and development continues to improve the emplacement time and crossing capability. Unique combinations of existing bridge types and expedient resources may be found in appropriate engineer manuals.

The use of captured permanent bridges requires knowledge of the current condition and/or original construction Forces seizing permanent bridges require accompanying engineer elements to neutralize explosive devices and reinforce weak or damaged portions. Planners rarely base the success of a crossing operation upon seizure of a permanent bridge.

BRIDGING	
FIXED	BAILEY BRIDGE MEDIUM GIRDER BRIDGE
FLOATING	M4T6 MOBILE ASSAULT BRIDGE RIBBON BRIDGE
CAPTURED CIVILIAN OR TACTICAL BRIDGING	
NOTE: Each lead assault brigade should have one bridge site to supplement the other crossing methods and to sustain the crossing rates required to build-up combat power on the exit bank.	



Fixed bridging is seldom used during the initial assault because of required assembly times and magnitude of the effort. Fixed bridging is supported by the banks or abutments and is installed over ravines as well as rivers. This type bridging is basically panel construction and is assembled in an "erector set" manner. During river crossing operations, they normally supplement or replace AVLBs or float bridges.

Bailey Bridges may be built in various lengths, heights, and widths to accommodate the desired load. In a two-hour period the longest class 60 bridge that can be built spans 18 meters (60 ft) and requires

one engineer platoon plus the bridge platoon. If greater risks are acceptable, additional panels are added requiring an additional one-half hour to provide a 24 meter (80 feet) capability. Longer class 60 spans require more construction effort and time.

Medium Girder Bridges are newer bridges that provide a greater assault capability than the Bailey. The normal configuration provides a class 60 capacity for 30-meter gaps and requires an engineer platoon one hour to assemble. Spans of 49 meters are possible with the addition of a cable reinforcement kit or the British link reinforcing kit.

Floating bridges are the primary means of rapidly crossing assault vehicles and supplies during river crossing operations. The **M4T6** is an older version which requires combat engineer unit labor in addition to bridge company personnel to assemble. In relation to newer methods, it is slow to install, requires secure riverline assembly sites, and combat engineer labor. For example, a 150-meter bridge requires two engineer companies (5 platoons) four hours, working at five assembly sites simultaneously. On-site construction time may be reduced up to two hours by pre-assembly of floats in rear areas and transporting by truck or helicopter to the river for final assembly. In corps crossings, bridging requirements are extensive, and use of the fixed bridge is often required. The M4T6 also supplements or replaces other float bridging that is needed forward.

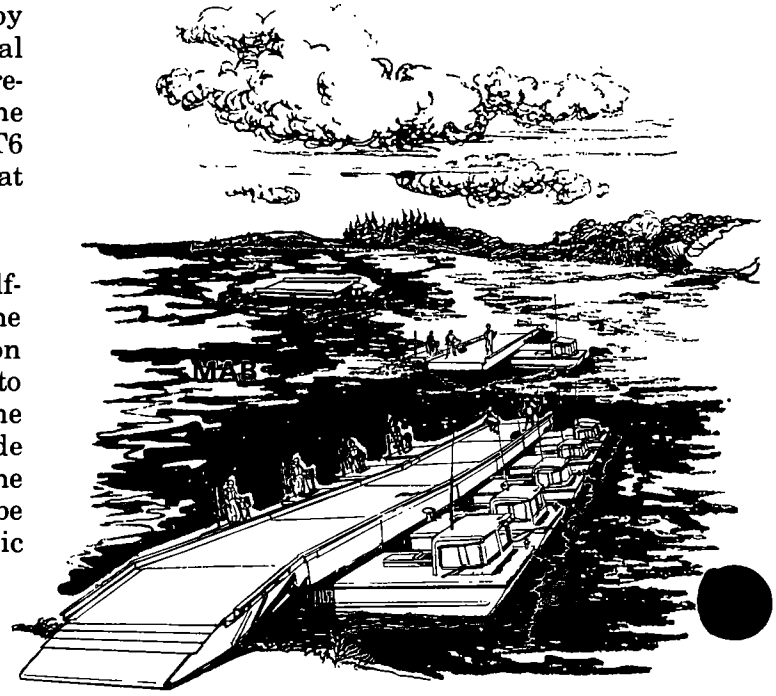
Mobile Assault Bridges (MAB) are self-contained, self-propelled units that enter the water from the march, lower a propulsion unit, rotate a roadway deck, and connect to other units to form rafts or bridges. Some units are equipped with decks that provide entry/exit ramps between the shore and the raft/bridge. A 150-meter bridge can be placed in operation in one hour by organic crews.

The **Ribbon bridge** consists of bays which are transported on 5-ton trucks. The bridge unit slides from the truck and unfolds into a floating roadway section upon entering the water. Power boats connect units into a raft or bridge. This bridge also has ramp units to connect the raft/bridge to shore. A 150-meter ribbon bridge may be assembled in one hour by organic crews.

The decision to install bridging requires careful consideration. The crossing force and area commanders must weigh the advantages of increased crossing rates versus the probability of losing a bridge to enemy activity. Available resources may be limited, permitting either rafting or bridging, but *not* both.

A simplified example of bridging and rafting comparisons follows:

A planning guide for bridge crossing is 200 vehicles per hour with 30 meters between vehicles. The river width or bridge length and stream velocity of up to 2.5 meters per second (8 fps) do not affect the crossing rate of class 60 vehicles. A 150-meter bridge of MAB or Ribbon requires organic crews one hour to assemble. This presumes the equipment to be on site and entry/exit banks prepared or ready at time bridge units are connected.



To raft a similar river of 150 meters, the equivalent amount of bridging can be made, with additional ramp units, into four class 60 rafts. Each raft can carry the equivalent of one class 60 vehicle and make six round trips in one hour. This equates to 24 class 60 vehicles per hour for all rafts. Organic crews can construct these rafts simultaneously in 10-20 minutes.

This comparison does not address the tactical situation, the available crossing sites, or other available crossing means. It does show that bridges, once installed, can cross considerably more traffic in equal time periods.

General advantages of rafts and bridges are shown below:

RAFTS	BRIDGES
Faster to install.	Greater crossing rate.
Multiple sites, less vulnerable.	Centralizes assets.

Other advantages/disadvantages may be listed, but these conclusions remain:

- Construct only enough rafts to cross critical assault vehicles required to secure initial objectives, thus permitting acceptable risk of bridge emplacement.

- Bridging should commence as soon as possible, dependent on tactical situation and equipment availability.

When rafts and bridges operate in close proximity, position rafts downstream to preclude a disabled raft from drifting into the bridge and damaging/destroying either or both.

The bridge equipment mobility and rate of installation indicates the priority for type and means employed. In priority, construct MAB, then Ribbon, then M4T6. As previously noted, preassembly of the M4T6 floats in rear areas with truck or helicopter transportation to crossing sites significantly reduces the final assembly time on the river. The M4T6 should be considered a normal supplement. Its crossing rate is the same as the MAB or Ribbon, once installed, and is an effective means to augment or replace the MAB or Ribbon when they are required to move forward with attacking forces.

The MAB and Ribbon bridges may be readily disconnected and segments dispersed to camouflaged positions along the shoreline or relocated and reassembled at alternate sites. Because of possible dispersion and relocation requirements, bridge anchorage systems are not installed unless the bridge is to be in position for periods of four hours or more. The same is true if the water current is so severe that power boats/bridge unit propulsion is inadequate to hold the bridge in position. Anchorage systems require engineer effort and time to install *and* restrict the rapid dispersion of the bridge.

Planners keep in mind the added security needed to protect bridges. The enemy will attempt to destroy them. He may permit their installation and then attack them with the goal of destruction, rather than preventing their emplacement. The plan must provide protection by air defense, counterfires, and overwatching maneuver elements to thwart enemy attacks. If possible, alternate bridge sites are developed so that bridges can be relocated a few hundred meters up or down stream.

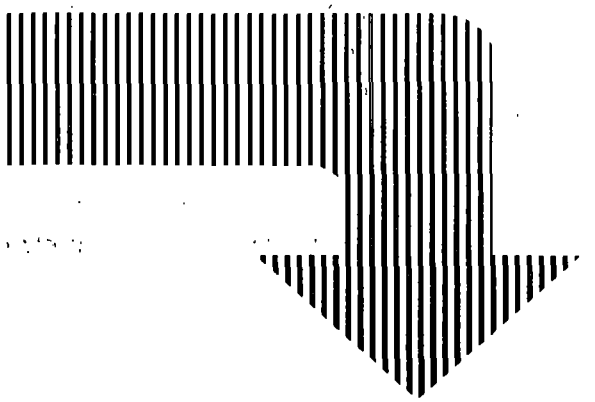
CROSSING AND MOVEMENT PLANS

The crossing plan provides for the movement of all elements of the crossing force during the crossing of the obstacle. It is developed in conjunction with other plans, especially those concerned with surface movement to and from the river, air movement, construction and maintenance of roads to and from the crossing sites, and the construction and operation of rafts and bridges (appendix G).

Specifically, the crossing plan provides for:

Crossing areas.	Delineating these areas.
Crossing sites.	Designating and allocating crossing sites and means to crossing elements.
Fording and amphibious vehicle crossing sites.	Designating and allocating their use to various units.
Rafts and bridges.	Designating the number, type, capacity, location, and time of opening rafts and bridges to be constructed.
Unit priorities.	Allocating unit priorities for use of the crossing sites and crossing means.
Crossing schedule.	Within priorities established, units establish a detailed crossing schedule specifying the number and type of vehicles.
Crossing area commanders.	To include designation of command and passage of control information.
Staging areas and engineer equipment parks.	Designation of these areas and parks as required.
Designation of alternating one-way traffic over bridges.	Established over the bridges only after movement to far bank is adequate to meet the needs of the assault forces.
Designation of one-way routes and the limiting of traffic to the area.	Establishing one-way routes and limiting types of traffic that are authorized to move to the area during the various phases of the river crossing operation.
Actions and responsibilities if traffic gets ambushed or interdicted by ground and/or airmobile forces.	Area commanders and convoy commanders must have specific guidance as to reactions and responsibilities if the convoy is ambushed or interdicted. Control of the reaction forces and the fire support must be delineated before the operation.

The **crossing schedule** provides a timetable for unit crossings at designated sites. The assault force (brigade) identifies the battalion crossing sequence; battalions specify the company crossing sequence. Requirements are matched with capabilities: crossing means and sites. Times for units/vehicles to arrive at designated sites are determined in relation to the initial assault (H-hour). For example, amphibians enter swim sites and tanks arrive at raft sites at specified intervals, rather than congregating on exposed banks and unnecessarily increasing their vulnerability.

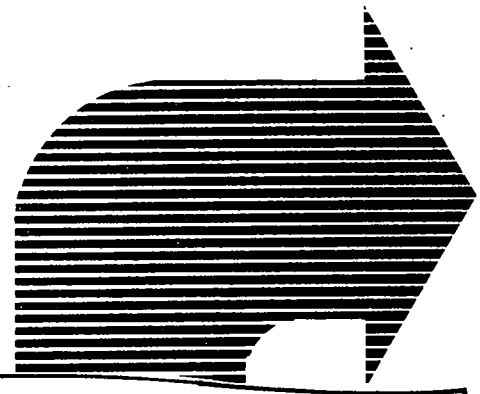


SITE	METHOD	UNIT	VEHICLES	TIME
* * *	* * *	* * *	* * *	* * *
2	SWIM	B/1-77	11	H to H + 10 min
* * *	* * *	* * *	* * *	* * *
* * *	* * *	* * *	* * *	* * *
5	HEAVY RAFT	A/1-1	22	H + 30 min to H + 1 hr
* * *	* * *	* * *	* * *	* * *
* * *	* * *	* * *	* * *	* * *
7	HEAVY RAFT	B/1-1	17	H + 1 hr to H + 2 hr
* * *	* * *	* * *	* * *	* * *
3	SWIM	A/1-2	25	H + 10 min to H + 1 hr
* * *	* * *	* * *	* * *	* * *
			* * *	* * *

The crossing schedule must be flexible enough to accommodate changes in the battle, and unit crossing priorities may have to be adjusted. Designated areas and alternate routes are used, where necessary, to hold up units or bypass congested, deteriorating, and/or enemy-interdicted routes. The brigade or CAC staff may develop the crossing schedule. Preferably, sub-unit details are provided by the brigade; and the schedule is coordinated and consolidated by the CAC staff, subject to brigade commander approval.

A **movement plan** facilitates traffic control within the crossing area. Routes leading to crossings are specified and traffic control posts (TCPs) are designated at critical points and intersections. Staging and holding areas are selected to provide locations for units to assemble, prepare vehicles for crossing, and await movement to the crossing. Multiple areas, located in depth and adjacent to selected routes, provide for dispersion of crossing units. Covered and concealed areas are desired.

The movement plan is published as an annex to the division operation order or as a separate movement order (appendix G). The plans include a movement overlay with attached traffic circulation details. Also included with the movement overlay is an engineer route classification overlay. A major control document, developed from movement planning graphs, is the road movement table. A portion of a road movement table is shown as a guide only:



(Classification)

ANNEX B (ROAD MOVEMENT TABLE) to OPORD

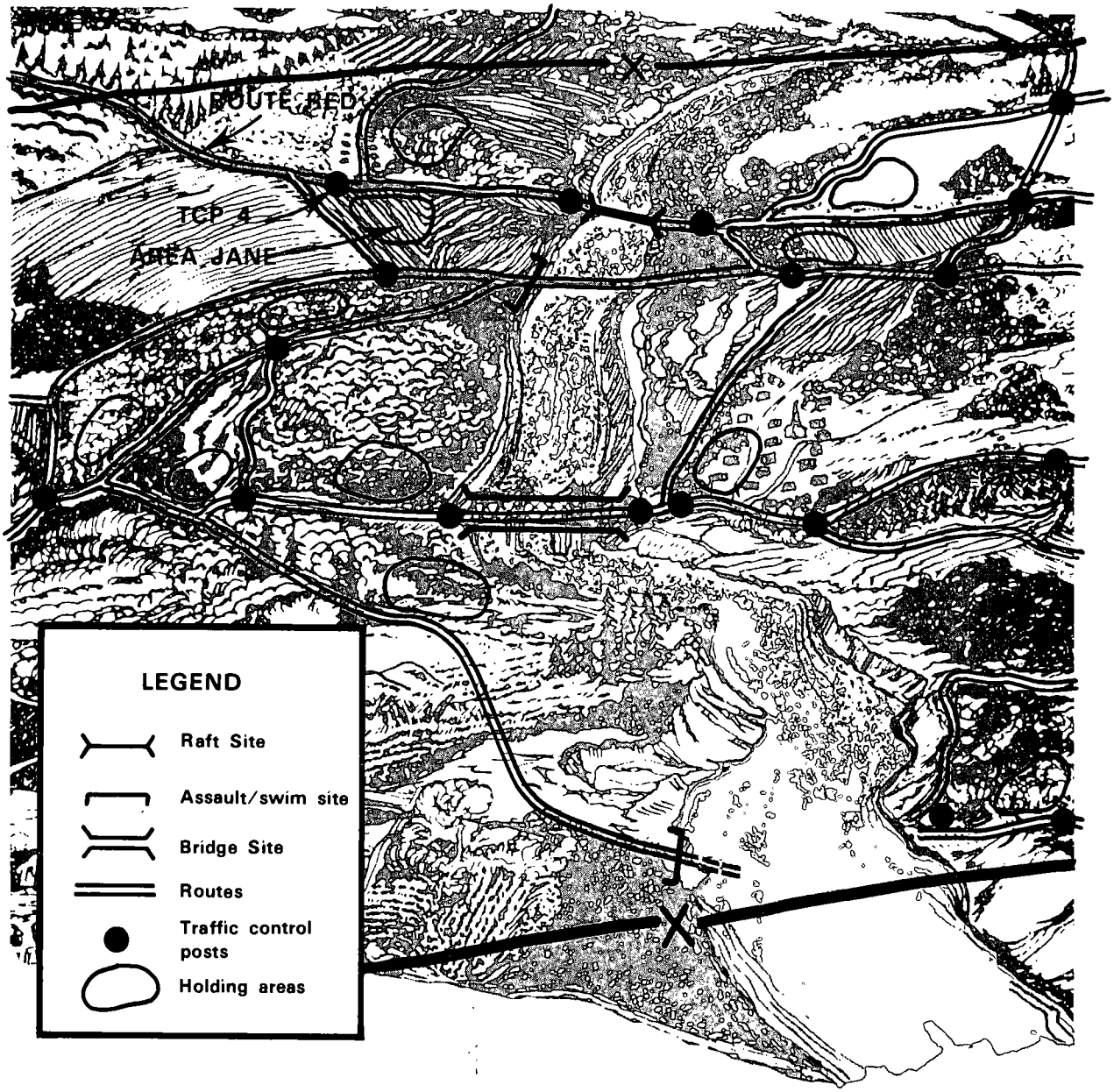
Reference: Map, series M504, AFGAN, sheet 4842 (BHAD-WURST), edition 1-DMG, 1.100,000.

Time Zone Used Throughout the Order: ZULU.

General Data:

1. Average Speed: 20 kmph.
2. Traffic Density: 20 veh per km.
3. Halts: SOP.
4. Routes:
   a. Route RED. Serials: 1, 3, 4, and 5.
   b. Route BLUE. Serials. 2 and 6.
5. Critical Points.
   a. Route RED.
      (1) Start point: RJ 413 at MB201699.
      (2) Release point: RJ 211 at QA990628.
      (3) Other critical points.
         (a) RJ (VILLERS) at MB330718.
         (b) RJ 242 at NB455701.
         (c) RJ (LAWST) at DA585692.
         (d) BLUE River bridge at PA683686.
      (4) Route classification: 6 50.
      (5) Route restrictions: BLUE River bridge-6 50
   b. Route BLUE.
      (1) Start point: RJ 526 at MS229509.
      (2) Release point: RJ 105 at RS981511.
      (3) Other critical points.
         (a) RJ 592 at MS334481.
         (b) RJ (CHANCE) at NS401490.
         (c) RJ (VEGAS) at QT790501.
         (d) BLUE River bridge at RS850495.
      (4) Route classification: 10 50.
      (5) Route restrictions: BLUE River bridge-6 50.
6. Main Routes to Start Point: * * *
7. Main Routes from Release Points: * * *.

Mov number	Date	Unit	No of vehicles	Load class of heaviest vehicle	From	To	Route	Route to start point	Critical points			Route from releaee point	Remarks
									Ref	Due	Clear		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
1	* * *	1st Bde	* * *	* * *	BHAD area	WURST area	RED	* * *	SP	0530	0635	* * *	* * *
									RJP(VILLERS)	0610	0715		
									RJ 242	0630	0735		
									RJ (LAWST)	0715	0820		
									BLUE River bridge	0755	0900		
									RJ (HAINS)	0815	0920		PST 65 min
									RP	0855	1000		
2	* * *	2d Bde	* * *	* * *	BHAD area	WURST area	BLUE	* * *	SP	0530	0635	* * *	* * *
									RJ 592	0548	0653		
									RJ (CHANCE)	0630	0735		
									RJ (VEGAS)	0800	0905		
									BLUE River bridge	0840	0945		PST 65 min
									RP	0920	1025		
3	* * *	3d Bde	* * *	* * *	BHAD area	WURST area	RED	* * *	SP	0650	0755	* * *	* * *



The CAC implements the crossing and movement plans through supporting and assaulting elements. The crossing area engineer maintains contact with sites for information on site development, crossing means installation, and traffic flow. He establishes regulating points, usually located with TCPs, to insure proper weight classification, preparation of vehicles before arrival at the crossing site, and rerouting where required. Military police operate TCPs, route traffic, and provide reports of the movement of units. *Movement control officers* are designated for each crossing battalion and separate unit. They are responsible for movement of their units in accordance with the crossing plan and maintain communications with the crossing area headquarters to receive information of changes. Changes may also be directly effected through the TCPs. The military police, operating in a common radio net, reroute traffic or direct units into assembly areas based on the flow of traffic along routes and into crossing sites. For further details, see "Control Measures."

ADVANCE TO THE RIVER

The first task of the river crossing operation or the last detailed planning task is the advance to the river. This task is executed as part of a river crossing in either a hasty or deliberate crossing. Although a deliberate crossing will include a pause short of the entry bank to build up combat power, maneuver forces will still execute this task as part of the attack.

It is during planning for the advance to the river, including the consideration of ability to project combat power across the river, that planners resolve the feasibility of the preferred form—a hasty crossing. The *key* considerations center on the terrain, the water obstacle, and the enemy.

Whether the current operation begins 20 to 50 kilometers from the river or has objectives near or on the entry bank, the anticipated crossing should be perceived as a hasty crossing. Changes in the enemy situation, additional intelligence, or the lack of engineer/bridging resources may require plans for a deliberate crossing. The significant factors of such a decision are: the previously planned river assault hour is delayed, the entry bank must be cleared of enemy forces, and more time is required to prepare detailed plans and build up combat power.

ALIGNMENT OF FORCES

The advance to the river may be conducted as a hasty or deliberate attack. While planning the advance, planners consider and tentatively determine the alignment of forces required to conduct the crossing. Plans are made to reposition forces where necessary and obtain crossing support prior to reaching the water obstacle. Crossing areas, control headquarters, and other control measures are designated *before* the advance to the river is initiated.

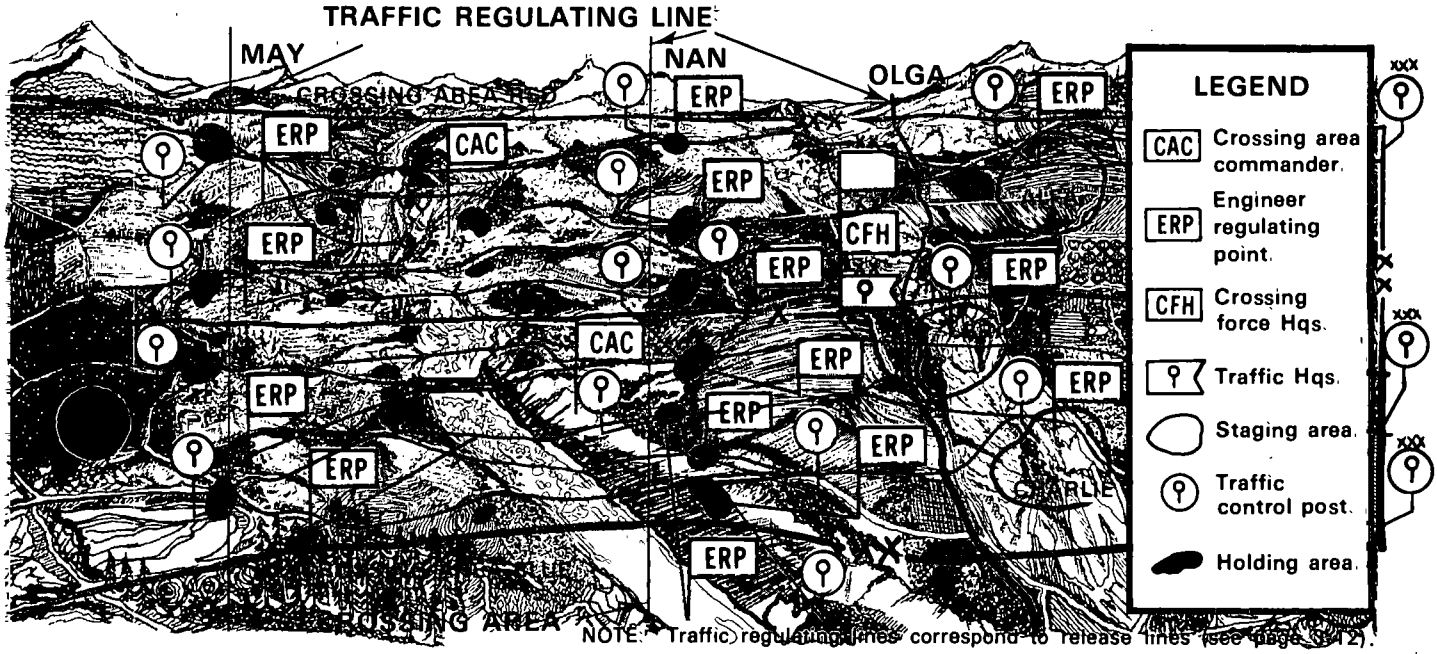
The conduct of the advance is not stereotyped. For example, it may begin as a hasty attack 20-30 kilometers from the river with lead battalions of the brigades advancing rapidly over multiple routes to secure objectives on or near the water obstacle. *Or* it may begin as result of a breakthrough evolving from a deliberate attack with forces advancing with relative ease toward the river. In either case, lead battalions may reach the river, seize enemy-controlled bridging or conduct an amphibious assault, and push across without realignment. Alternatively, lead battalions may secure objectives which dominate the obstacles and overwatch other forces which rapidly pass through to conduct the river assault.

If alignment of force is required for the river crossing operation, it should be accomplished prior to the start of the advance to the river. The advance to the river in a hasty crossing is timed so that the crossing unit does not pause on the friendly side to concentrate troops and equipment, but moves directly into the water. Once started, the assault forces move rapidly to keep the enemy off balance and to complete the crossing before the enemy can establish strong defenses. A rapid advance to the river may permit securing of bridges before the enemy can destroy them. However, securing of bridges intact should not be part of the crossing plan to move the force across the river—but rather a bonus.

TRANSFER OF CONTROL

As the assault forces advance to the river, in accordance with the crossing and movement plans and mutual agreement between the assault force and crossing area commanders, control is passed from the assault force commander to the crossing area commander. The decision as to when an assault force commander relinquishes control to the crossing area commander depends on the tactical situation within the crossing area.

Once crossing areas are established and transfer of control is made, the crossing area commander controls movement within the crossing area. As previously mentioned, the rear limit of the crossing area is approximately 2-3 km from the river. From this time on, regardless of scheduling, vehicles move into the crossing area only on call from the crossing area commander.



NOTE: Traffic regulating lines correspond to release lines (see page 3-42).

CONTROL MEASURES

Up to this point, planning, tactical and crossing operations, crossing and movement plans, and command and control organizations have been discussed. How can commanders maintain control and carry out plans to complete the river crossing operation successfully?

The following is a list of some of the techniques and control measures which should be used to carry out a river crossing operation:

- Effective command relationship.
- Detailed and efficient planning.
- Clear and manageable plans and orders.
- Up-to-date unit SOPs.
- Adequate security forces.
- Responsive fire support and air defense.
- Proficient units, crews and operators.
- Serviceable and effective communications equipment and nets.

- Identifiable and functional control areas and lines:
  - Crossing areas and sites
  - Staging areas
  - Holding areas
  - Traffic control posts
  - Engineer regulating points
  - Traffic regulating lines
  - Positive traffic headquarters

Many of the techniques or control measures are prerequisites for successful completion of any operation. Depicted in the preceding diagram is the graphical relationship of specific control measures used in river crossing operations.

TRAFFIC HEADQUARTERS

Traffic headquarters is an operating and planning agency which is delegated authority to plan, schedule, route, and monitor the movement of traffic. The traffic headquarters should be located with the crossing force's headquarters (CFH). And, it must work closely with elements of the unit's staff.

In a river crossing operation, the traffic headquarters places priority on:

Assisting the crossing force staff.	In developing priorities for movement. In use of routes by elements of the crossing force, to include its attached and supporting units.
Allotment of times and routes.	Establishing and disseminating a provisional allotment of times and routes of movement to units.
Consolidating road movement tables.	
Scheduling highway movements.	
Preparing the crossing force road movement graphs and tables.	Based on the crossing plan.
Preparing the traffic circulation plan, which identifies the road net and includes:	Classification. Direction of movement. Bridge and raft capabilities. Other route restrictions Staging areas. Holding areas. Traffic control posts. Engineer regulating points. Traffic regulating lines.
Monitoring traffic movement.	Throughout the unit area, exclusive of the forward combat zone.
Providing procedures for changing routes, schedules, or priorities.	As directed by the crossing force headquarters.

The division transportation section provides the nucleus for the traffic headquarters at division. The section requires augmentation by additional movement, administration, and support personnel to operate the traffic headquarters. Augmentation will normally be provided by COSCOM. The division signal battalion provides the traffic headquarters with communication support; the division military police company provides assistance in controlling the flow of traffic.

Movement to the rear of the crossing areas is controlled through unit commanders and the traffic headquarters. As the assault forces move forward, the traffic headquarters controls movement beyond the crossing areas and up to the area controlled by the assault force.

FM 55—10 and **FM 100—10** provide details of the operations of traffic headquarters.

TRAFFIC AND MOVEMENT CONTROL

Crossing control officers are designated to assist in the control of units during a crossing. They assist the crossing area commander in maintaining an uninterrupted, orderly movement across the water.

Each crossing unit designates a crossing control officer who maintains contact with the crossing area commander.

Listed below are certain control techniques that, when used by the crossing control officer, will expedite the flow of traffic across the river:

Designating and marking certain vehicles and equipment.	Such as command, communication, ammunition, and ambulance vehicles to insure high priority of movement on the road net and on the crossing means.
Plainly marking convoys.	With their priority and serial number so that markings can be read from the air and the ground.
Assigning an overall priority to each element scheduled to cross the river.	To assist in maintaining a proper order of movement if some of the crossing means are destroyed.
Restricting the flow of traffic returning from the far bank.	In early stages of the operation.
Limiting essential returning vehicles or personnel.	To crossing on rafts or to being moved by helicopter.

Traffic Regulating Line. This line is a control measure used to delineate areas of responsibility for traffic regulation and control as exercised by different elements of command.

A traffic regulating line to supplement normal control delineated by unit boundaries may be established immediately to the rear of the reserve and trains areas of the assault brigades. This limits the brigade commander's responsibility for traffic control to his rear. A traffic regulating line may be established on either side of the river to delineate the traffic regulation and control responsibilities of the crossing area commander. Other traffic regulating lines may be established to facilitate the control of vehicular density throughout the division and to indicate the forward limit of corps' area of responsibility for traffic regulations.

Traffic regulating lines should be established along easily defined terrain features or manmade features.

Traffic Control Posts. Military police at traffic control posts (TCPs) within the area of an assaulting division perform their normal functions of traffic control by enforcing traffic rules and providing information and directions.

In a river crossing, these TCPs also assist in traffic regulation by reporting to traffic headquarters on the movements of units and convoys. TCPs may also relay messages between traffic headquarters and moving units. TCPs are located on both banks of the river to control traffic moving toward or away from the river and normally are located at the following specific points:

Major crossroads and road junctions.	Along the main supply route and near division rear and lateral boundaries where uncontrolled entry of traffic from adjacent unit areas could interfere with division surface movements.
Staging areas.	At principal entrances to and exits from staging areas.
Holding areas.	At entrances and exits.
Critical crossroads and road junctions.	Across the river and within or beyond crossing areas.
Engineer regulating points (ERPs).	

CONTROL AREAS

Staging areas are waiting spaces for convoys designated to cross the river and are located far enough from the river to facilitate rerouting and use of the alternate roads to raft and bridge sites.

STAGING AREAS

Staging areas are used by corps and army units that support the division and cross in the division zone. Traffic headquarters designates staging areas in the traffic circulation plan. Movement to and from staging areas is according to planned times and is controlled by the TCPs.

AREAS SELECTED FOR STAGING REQUIRE:

- **Cover and concealment.**
- **Easy accessibility.**
- **Sufficient area for vehicle and equipment dispersion.**

Normally, all troops and their accompanying vehicles, except units detailed to support the assault from positions forward of the assembly areas and reconnaissance elements, assemble in the staging areas and move forward, when ordered, under unit control through assembly areas to the river. Units move into the staging areas according to their mission in the crossing plan, regardless of their previous functions during the advance to the river.

HOLDING AREAS

Holding areas are waiting spaces both near and within crossing areas to handle vehicles should a sudden interruption occur in the movement of traffic across the river. Vehicles move into these areas and disperse rather than standing on the roads and restricting the flow of traffic into crossing areas.

Holding areas just outside the crossing areas are located with access to all principal roads leading to the crossing sites. Holding areas must be established on the near and the far banks. Holding areas on the far bank may be used temporarily to hold and reassemble unit convoys that are utilizing various crossing means before continuing movement.

Depending on the availability of terrain, these holding areas are located to facilitate traffic into and from the areas consistent with the principle of maximum flow and minimum control. These areas are normally established and operated by military police as provided for in the traffic circulation plan and as directed by the crossing area commander.

Holding areas located within crossing areas, at one time designated dispersal areas, are located along the roads leading to the bridge and raft sites. These areas provide space where vehicles can be halted and dispersed to avoid congestion on the access roads to the crossing sites when the flow of traffic has been disrupted or there is a reduction in the capability of the crossing means. The holding area detail operates under the crossing area commander and is in constant communication with him.

Engineer Regulating Points. ERPs are located near or within staging areas, holding areas, or crossing sites where technical checks are made to insure that vehicles crossing the river match the capability of the crossing means and to determine the load-carrying capacity of the crossing means. Personnel at the ERP may also assist the traffic headquarters and crossing area commander in maintaining maximum traffic flow. Engineer personnel operate the ERP. The crossing area commander controls the ERP within the crossing areas; the traffic headquarters has operational control of all other ERPs. The ERP is located far enough from the river to allow flexibility in routing of vehicles to appropriate sites.

Engineer Equipment Parks. Engineer equipment parks are areas normally located at least 1 kilometer behind bridge and raft sites for the assembly of engineer vehicles, equipment, and materiel to be used during the crossing operation. Empty engineer bridge vehicles should be moved away from the river and crossing areas as soon as practicable. Equipment parks should be located to prevent congestion of traffic leading to the crossing areas.

AT ERPs OUTSIDE THE CROSSING AREAS:

- **Vehicles are examined to determine correct load classification.**
- **Vehicles are inspected to insure proper loading with respect to technique and dimensions.**

AT ERPs ON THE CROSSING SITE:

- **The load-carrying capacity of each of the crossing means is determined.**
- **This information is kept current and is regularly disseminated to traffic headquarters and the crossing area commanders.**
- **Crossing area commanders use this information to reroute traffic when technical difficulties or enemy action renders a crossing means inoperable or reduces its capacity.**

Examples of a crossing plan may be found in appendices E and G. Appendix E provides a general scenario for an offensive crossing with planning aspects of the assault crossing of the river. Appendix G, although titled "Type Retrograde Crossing Order," provides sample elements of a crossing and movement plan.

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CHAPTER 4

retrograde crossings

This chapter addresses in detail only those actions which are unique to **retrograde** crossings of a major water obstacle. Such crossings are characterized by centralized control and detailed planning within the time available.

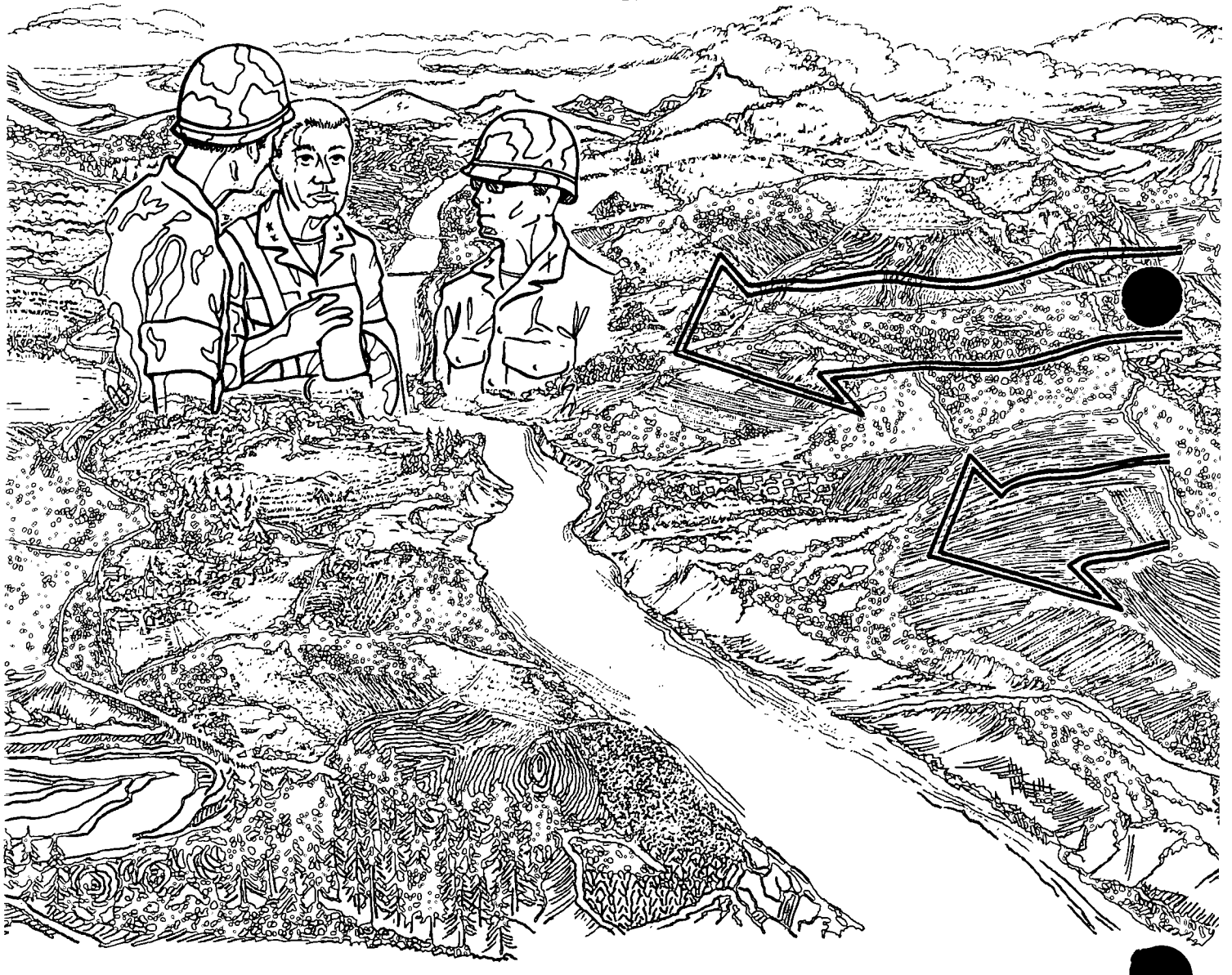
Retrograde operations are undertaken to trade space for time by **delay**, to disengage from enemy contact by **withdrawal**, or to move away from an area without enemy pressure as in a **retirement**.

Enemy pursuit action of the type and intensity described in this chapter will reduce the time available to the commander for detailed planning. Retrograding elements will rely on standing operating procedures and previously developed contingency plans.

PLANNING THE OPERATION

Planning must be as detailed as possible within the time available. One advantage to our forces is that both banks of the water obstacle will be under friendly control. Accordingly, detailed information concerning the obstacle and the area over which the retrograde to the obstacle must be conducted is readily available to the commander. This knowledge, combined with information of enemy strengths, dispositions, and expected tactics, allows the commander to task-organize his forces in the most effective manner for crossing. Enemy pursuit may cause the retrograding commander to institute a *DELAY.*

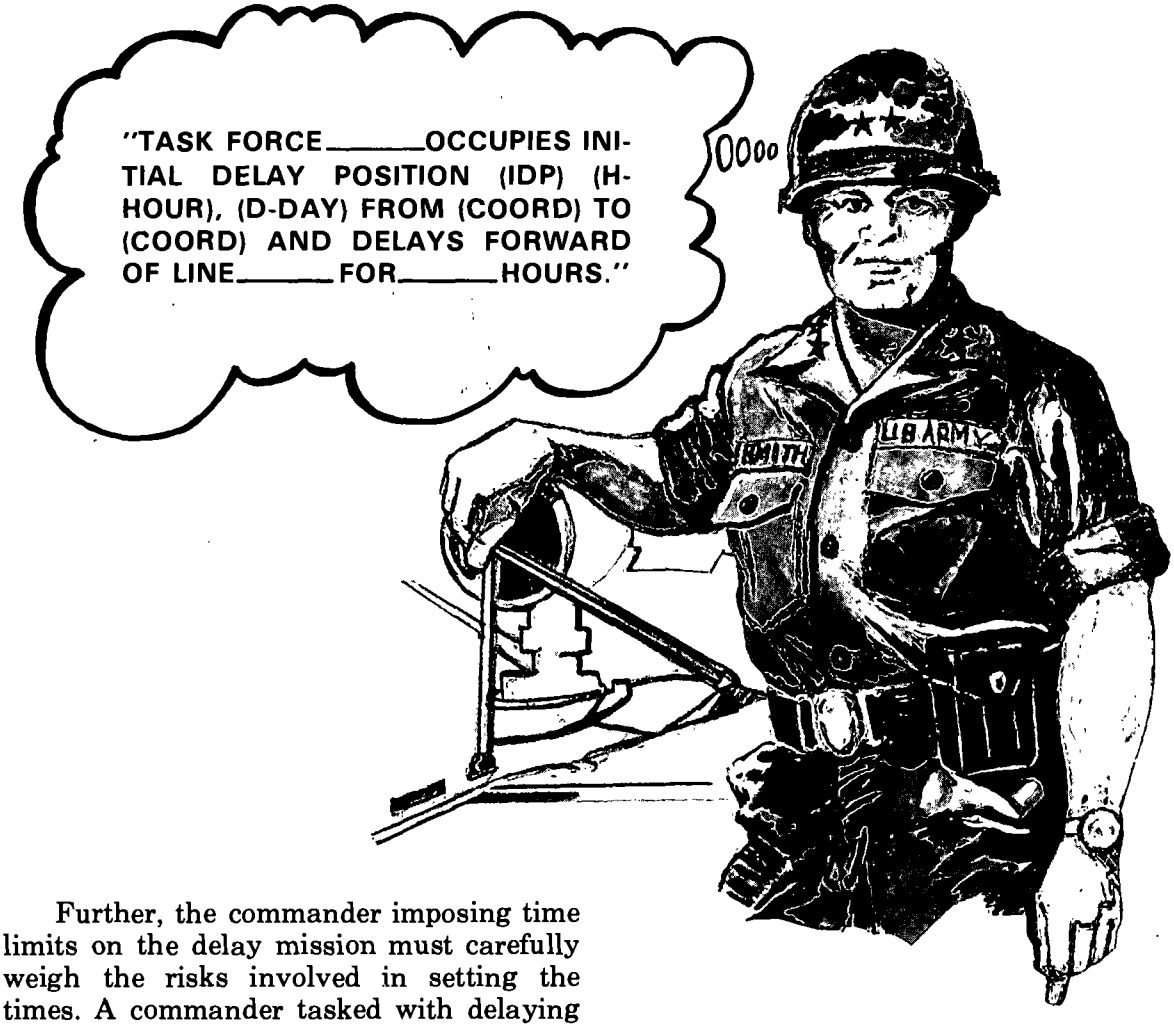
In a delay mission, a force conducts any or all types of combat operations in order to gain time for something else to happen—time for reinforcements to arrive, or time for a major portion of the force to cross a water obstacle, or time for forces to concentrate elsewhere. Combat operations executed in this mission may include attack, defense, ambush, raid, feint, or any others appropriate to mission accomplishment.



Normally, a delay mission is an economy of force operation; so, the force may expect to fight outnumbered. If the force cannot successfully defend in place, it must trade space for time. Nonetheless, a commander assigned a delay mission should not assume that his force will always be defending or withdrawing.

Indeed, the advantages of surprising the enemy, seizing the initiative, and generating uncertainties in the minds of enemy commanders may well indicate the desirability of attacking. The enemy generally is impeded most when his losses are high; so, the delaying force seeks by whatever means possible to inflict maximum casualties on the enemy.

For larger forces (brigades and divisions) a delay mission is usually a time and/or terrain-limited series of defensive actions. A delay operation denies the enemy access to a specified area for a specified time, inflicting on him the maximum possible casualties that can be expected, given the strength of the delay force. Thus, a covering force might be ordered to fight the enemy forward of a specified place (perhaps the holding line) for a specified time (perhaps 72 hours).



Further, the commander imposing time limits on the delay mission must carefully weigh the risks involved in setting the times. A commander tasked with delaying forward of a river line for 24 hours must deploy sufficient force to have a reasonable chance of carrying out his task.

A RETROGRADE MOVEMENT MAY BE REQUIRED WHEN:

- The force is to be employed elsewhere or in a better position.
- Continuation of an operation no longer promises success.
- The purpose of the ongoing operation has been achieved.

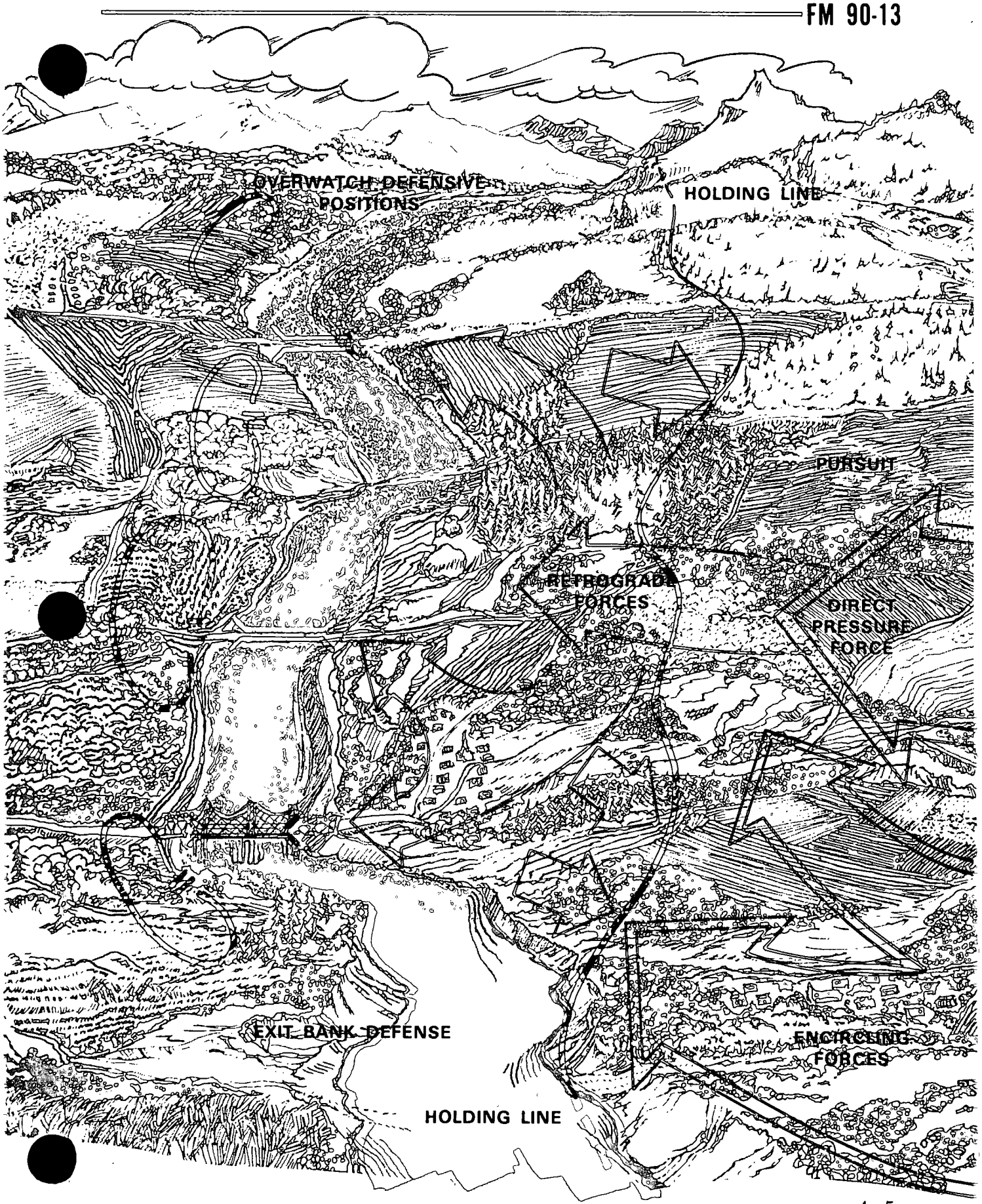
The type of retrograde operation:
DELAY—WITHDRAWAL—RETIREMENT
will be determined by the purpose of the rearward movement.

A river crossing conducted in conjunction with a retrograde operation will differ from an offensive crossing in several aspects:

- Existing bridges or other crossing sites will be intact and available to the retrograde force to speed the crossing. When only a few crossing sites are available and the enemy is applying heavy pressure, the crossing assumes a more deliberate character. It is the more deliberate retrograde crossing that is described in this chapter.
- Relative combat power advantage will favor the enemy.
- Enemy commander will enjoy a maneuver advantage.
- Command and control will be more difficult for the crossing force.

Enemy offensive action described in **FM 100—5** and **FM 30—40,** or the lack of such action, will determine the type of retrograde operation to be conducted, and may, in fact, jeopardize the success of a retrograde crossing. In any event, enemy pursuit action will constitute the most serious threat to a successful retrograde crossing. The pursuing force seeks a rapid, deep penetration to cut off and annihilate the retrograding force. The pursuit force attacks from columns to accomplish its mission. Lead elements of pursuit columns will attempt to fix retrograding forces while other forces attempt to encircle. Pursuit force motorized rifle elements will mount continuous flanking attacks. Artillery and tactical air organic to the pursuit force place continuous fires on retrograding forces. Unrelenting pressure is maintained day and night until the retrograding force is destroyed. The pursuit force commander can be expected to alternate his direct pressure, flanking, and uncommitted forces to insure their continued combat effectiveness. In all cases, a defensive force on the exit bank is required to overwatch the completion of the crossing.

A RETROGRADE CROSSING OF A MAJOR WATER OBSTACLE IS NOT AN OFFENSIVE CROSSING CONDUCTED IN REVERSE.


OVERWATCH DEFENSIVE POSITIONS
HOLDING LINE
PURSUIT
RETROGRADE FORCES
DIRECT PRESSURE FORCE
EXIT BANK DEFENSE
ENCIRCLING FORCES
HOLDING LINE

The retrograde crossing operation is divided into three identifiable segments for purposes of discussion:

DELAY—DEFENSE—CROSSING

Although each segment is discussed separately, in actual execution of the retrograde crossing, the actions take place concurrently.

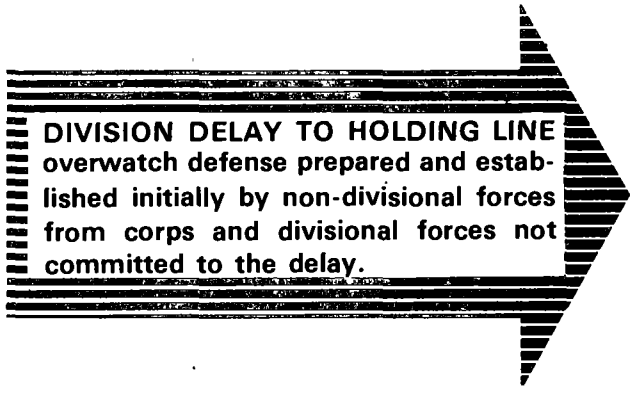
THE DELAY

The delay is conducted to trade space for time and/or risk. In this instance, the delay is conducted in order to allow the main body of the force (division) to retrograde rapidly across a major water obstacle.

The delay can be conducted continuously, over successive positions to the rear, or over alternate positions, depending upon the type forces employed. Because of the mobility of the Armored and Mechanized Divisions, and the nature of the mechanized battlefield, a delay conducted on alternate positions may be inappropriate. For a discussion of delay over alternate positions, see **FM 71—101.**

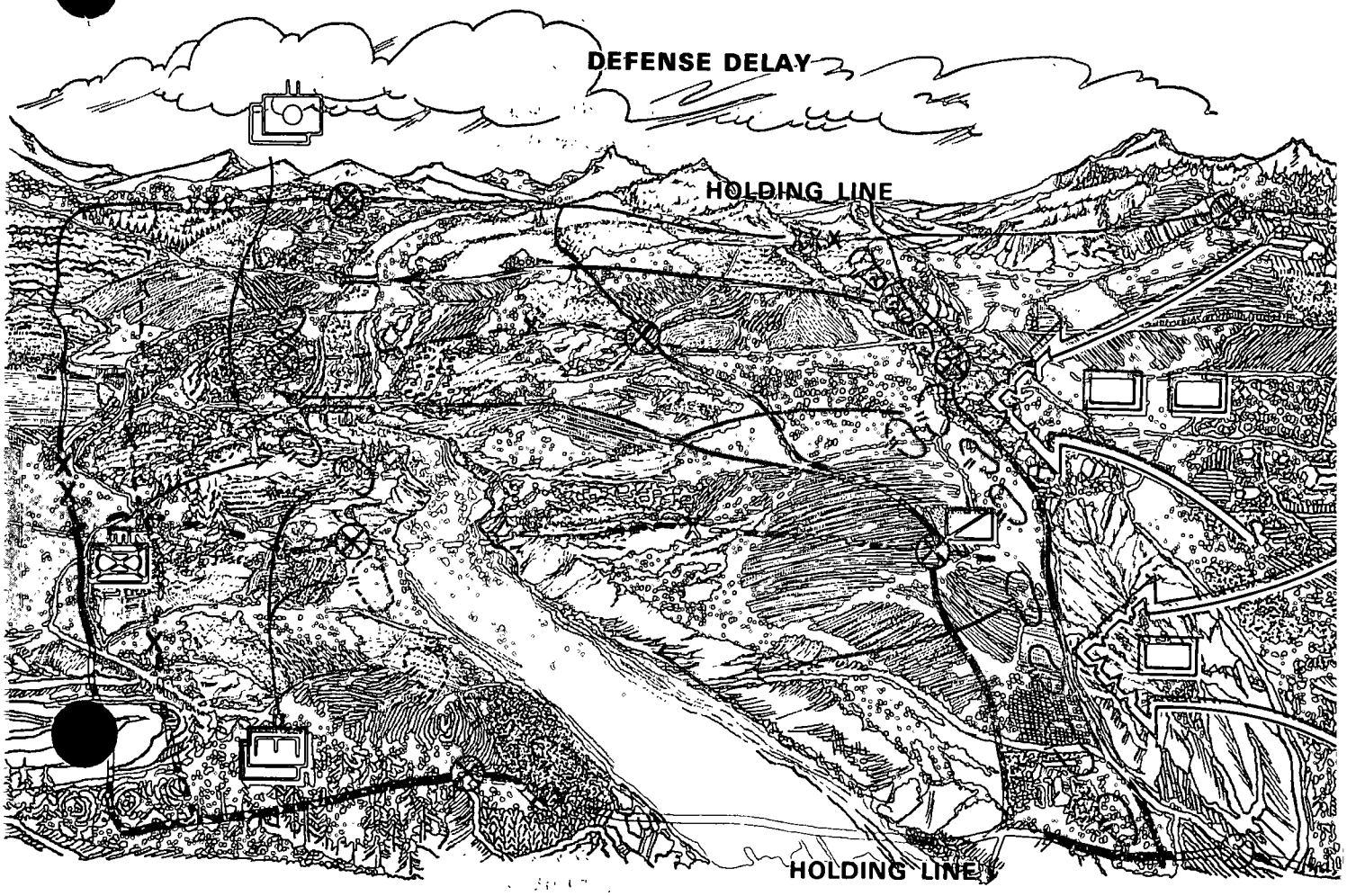
The delay is conducted in the same manner as the covering force battle described in **FM 71—100.** It is a major battle of attrition against a numerically superior pursuing enemy. The battle is fought from successive positions, in depth, to maximize destruction of the enemy without the delaying force, *as a whole,* losing its ability to maneuver.

The delay may be conducted by divisional elements in contact and may consist of elements of one or more brigades. The size of the delay force will be determined by many factors, such as the length of time required to establish the overwatching defense, and time necessary for development of the crossing area. Augmentation by nondivisional Air Defense Artillery (ADA), Engineer, or Field Artillery (FA) may be required if the desired delay is for a protracted period and the pursuit force is very strong.



Elements not assigned missions in the delay will execute a planned retirement/withdrawal and cross the water obstacle as rapidly as possible. These units may have missions within the crossing area or in the overwatch defense which must be established on the exit bank. Movement of these elements towards and across the obstacle must be consistent with a believable deception plan in order to preclude early enemy detection of specific crossing sites.

The delay will be continued until the battle is within communications and fire support range of the exit bank defense. At this point—forward of the *holding line*—the defense assumes responsibility for the battle. The holding line is established on defensible terrain between the river and the enemy, and is sufficiently forward to preclude direct and observed indirect fires into the crossing area. Those elements of the delay force still on the entry bank complete the retrograde crossing.



THE DEFENSE

Regardless of the original reason for the retrograde crossing or the ultimate mission of the division, a strong exit bank defense must be established. This defense will overwatch the crossing of those forces remaining on the entry bank. Again, detailed planning within the time available is necessary to insure successful execution of this phase of the retrograde crossing.

The defense force initially is small. It consists of elements not involved in the delay, as well as augmentation from corps resources. Since forces are not available to defend all points, the defense must be planned to provide for rapid lateral movement to concentrate firepower. This lateral movement provides favorable force ratios at the required time and place.

After the defense force has assumed responsibility for the battle from the delay elements (at or forward of the holding line), the requirement for close and continuous coordination becomes acute The defense must be able to mass and concentrate its firepower to allow elements in contact to withdraw/retire and complete the retrograde crossing. If the defense cannot

sustain the requisite combat power to concentrate, unacceptably high losses can be anticipated among those elements on the entry bank.

Defense under these conditions will necessarily impose time/terrain-sensitive missions on all forces. Once it assumes responsibility for the battle, the defense is expected to destroy or contain the enemy in a specified area, thus allowing successful completion of the retrograde crossing. To accomplish this mission, the defense which is initially small, begins to be thickened at or forward of the holding line by elements previously conducting the delay.

The defense will contain the enemy while selected elements break contact and withdraw across the obstacle.

Where time permits, written plans are prepared and disseminated well in advance. Plans and orders must be short, uncomplicated, and issued far enough in advance to provide maximum reconnaissance time for units. Great dependence will be placed on execution through unit standing operating procedures, supplemented by plans and orders. The defending force commander controls the battle by allocating forces and fires to elements in contact, assigning phase lines to control rearward movement, adjusting lateral boundaries to facilitate maneuver and fire control, assigning battle and blocking positions to insure mutual support, and maximizing the effects of weapons systems. Even with a restrictive mission, subordinate elements must maintain sufficient flexibility to react to enemy actions.

SUBORDINATE ELEMENTS MUST BE FLEXIBLE

To insure that the relative combat power of the initial defense is maximized, full protective use of the terrain is required in positions overwatching the river crossing areas. Defending commanders and staffs must perform an in-depth reconnaissance to visualize the defensive battle. Natural obstacles that would impede the enemy advance are controlled with fires, and approaches into the area are made more difficult with mines and other obstacles. This tactic frees maneuver forces for commitment to more critical areas.

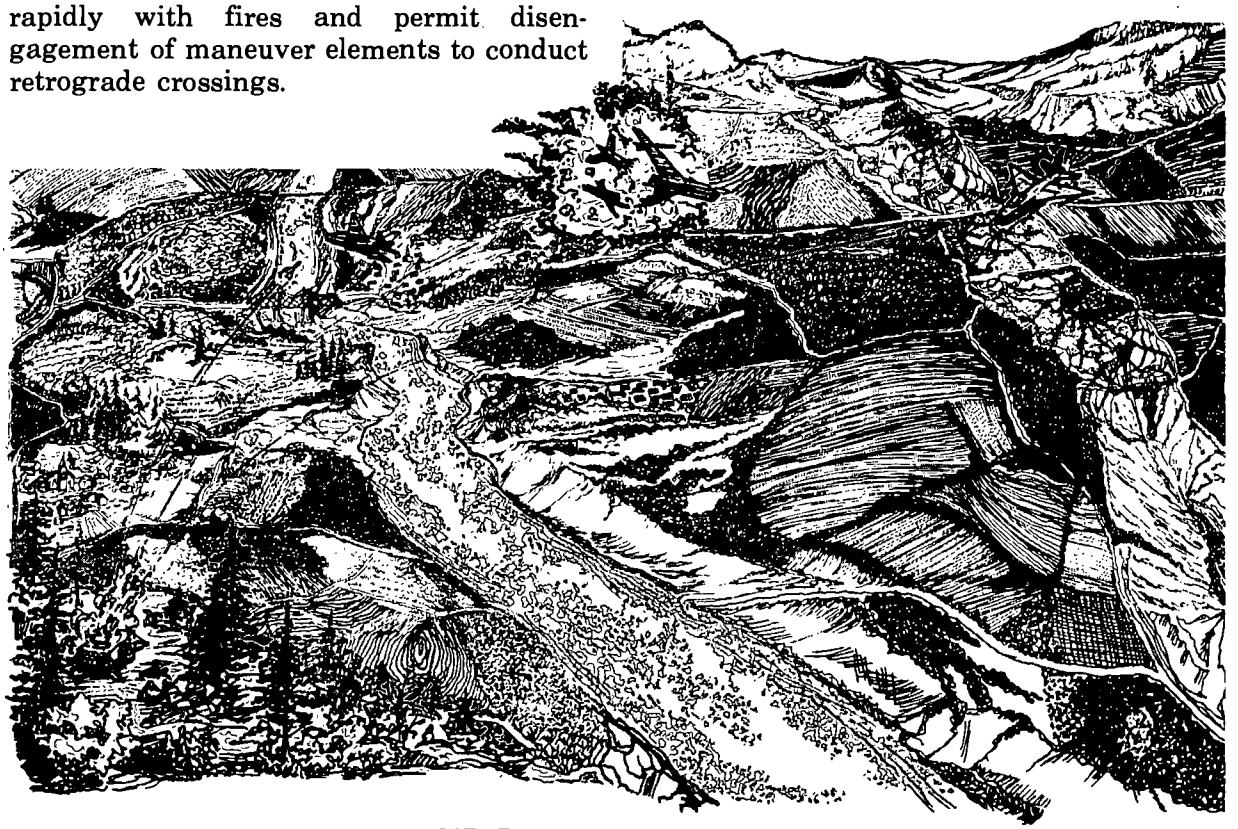
NEED IN-DEPTH RECONNAISSANCE

Initially, field artillery fire support available to the defense will be very limited because the bulk of the artillery will have been placed in support of the delay to increase its combat power. As the delay continues towards the holding line, echelonment of artillery to the rear of the delay force provides the defending force with increased fire support when they assume responsibility for the battle.

Artillery fires will be continued at long ranges to destroy enemy forces, slow their movement, force time-consuming deployment, and canalize forces into areas which maneuver elements and tactical air can engage at maximum effective ranges.

Artillery in the defense area consists of direct support and reinforcing battalions dedicated to supporting the defense plan. Corps artillery units are given general support or general support reinforcing missions to make their fires responsive to the defense commander. This allows the commander to weight the critical areas rapidly with fires and permit disengagement of maneuver elements to conduct retrograde crossings.

Initially, the bulk of organic air defense means are employed to defend maneuver elements in the delay. HAWK units, displaced to the rear by echelon in the early stages of the retrograde, are positioned to provide low- and medium-altitude area air defense for both the delay and the crossing area. HAWK units, normally in direct support of each committed division, may be able to provide area coverage over both the delay and crossing areas from positions on the exit bank. In any event, because of the importance of maintaining air defense coverage over the crossing, the HAWK units should be deployed to the exit bank early in the retrograde. When the enemy has air superiority or when air parity exists, additional air defense units will be required in the crossing and defense areas to insure success of the crossing. Additional Chaparral/Vulcan (C/V) units from corps assets are positioned to provide air defense of vital installations and facilities within the crossing and defense areas.



AIR DEFENSE COVERAGE

The range capability and numbers of divisional short-range air defense systems available will not permit coverage of the entire defense force area. The defending commander establishes his priorities for air defense. The C/V and area coverage direct support HAWK battalion commanders deploy their firing units to defend assets in the established order of priority. This insures protection for the most critical assets and concurrently provides a limited measure of area coverage.

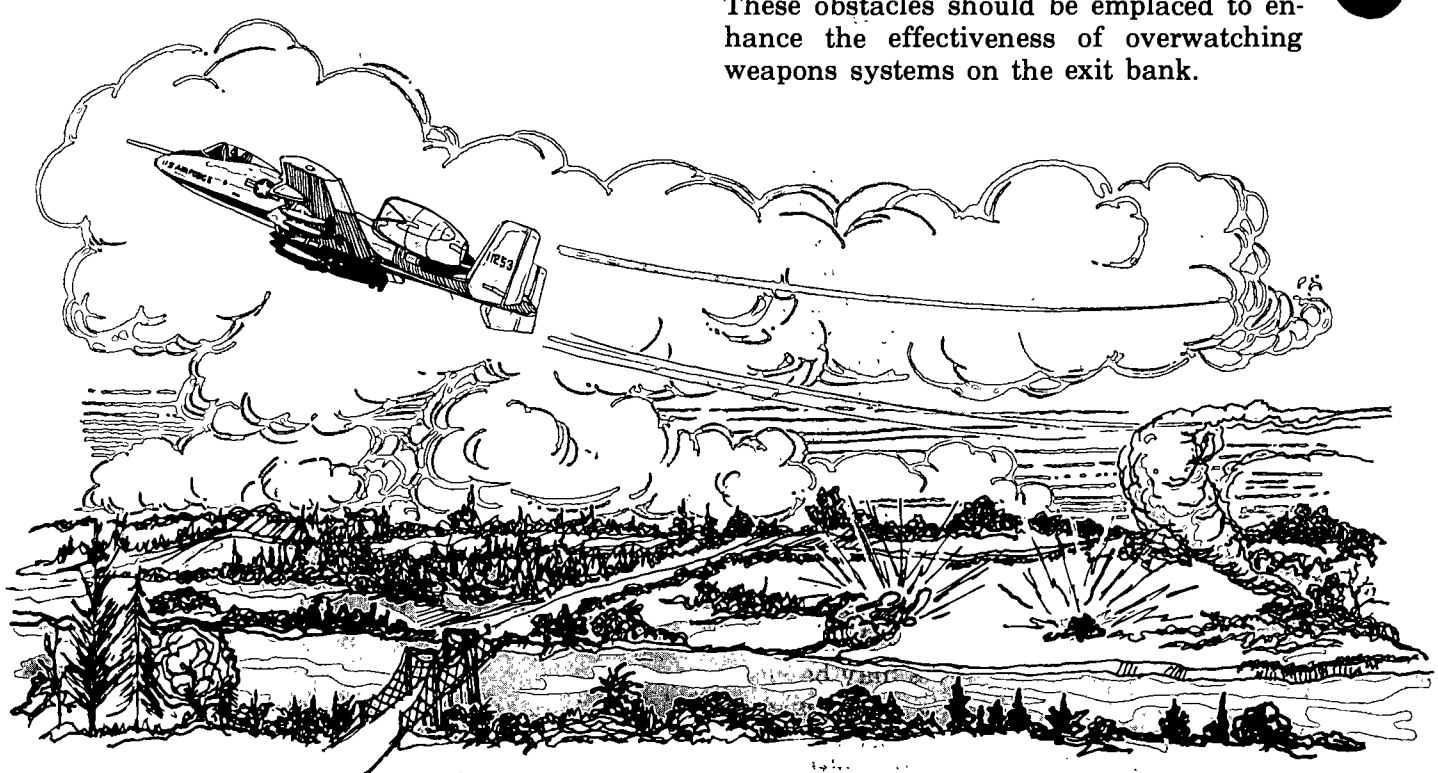
Air defense deployment must insure the requisite *mix* and *mass* of systems to maximize the defense. As additional air defense assets become available from the delaying forces, air defenses will be thickened and coverage will be provided to other critical assets within the defense area.

Most of the divisional engineer assets will have been allocated to support of the delay. As a result, the defending area will have to rely heavily on non-organic engineer elements from corps to assist with development of the exit bank defense as well as tasks within the crossing area.

Engineer tasks associated with support of the defense fall into two general categories. First, the development of exit bank defenses. Second, the establishment of obstacles to enemy movement on the entry bank side past the holding line.

Defensive positions on the exit bank must be developed and continually improved in order to insure accomplishment of the overwatching defense. Defending forces will require development of lateral combat routes within the area to provide for rapid concentration of combat power. Defilade firing positions must be provided, particularly for direct fire antitank weapons systems which will be placed close to the edge of the water obstacle.

Engineer tasks in the crossing area will involve development of obstacles that impede or canalize the enemy as they approach the entry bank from the holding line. These obstacles should be emplaced to enhance the effectiveness of overwatching weapons systems on the exit bank.



TACTICAL AIR SUPPORT

ARMY AVIATION SUPPORT

At this point in the retrograde crossing effort (when the last elements are attempting to break contact and cross), the timely and effective employment of available tactical air becomes increasingly important. Tactical air assets, in conjunction with field artillery, will be used to attack enemy columns and artillery positions to disrupt their advance toward retrograding elements.

Available Army aviation assets (both divisional and non-divisional) will be used to support the crossing effort, resupply the delay, and speed the establishment of the defense area. As the battle is taken up by the defense, attack helicopters may be used to assist delaying elements in breaking contact with pursuit forces. These aviation elements can maintain contact with and pressure against the advancing enemy.

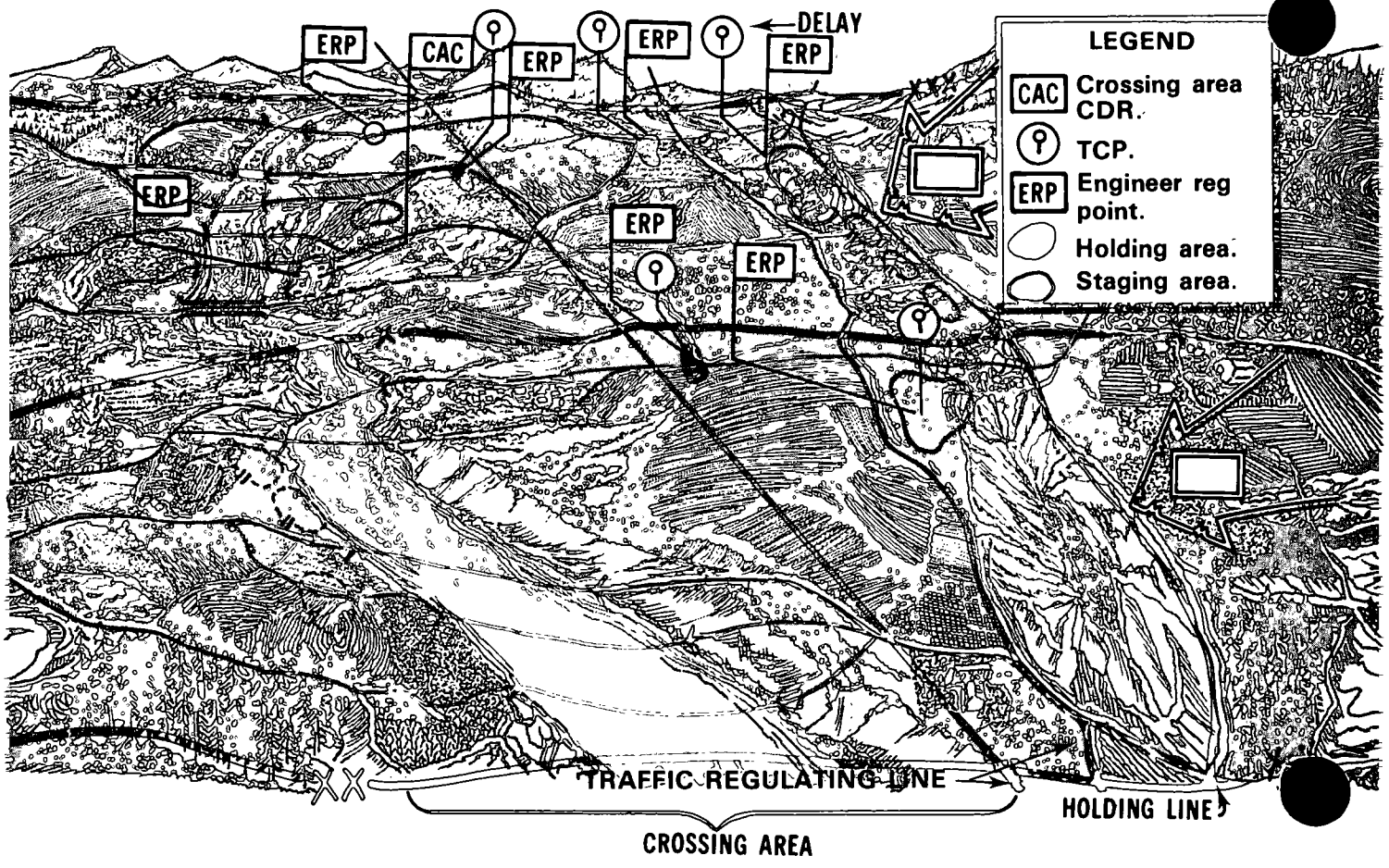
THE CROSSING

Activities within the crossing area do not differ significantly, whether the crossing is in the offense or in retrograde (see chapter 3). As in the offense, planning requirements in the crossing area must be closely tied to activities of maneuver forces.

Since friendly forces will have controlled both banks of the water obstacle for some period prior to the retrograde, existing bridges should have been improved and repaired. All permanent crossing means provide retrograde crossing facilities. Available tactical bridging can be installed to the rear of the retrograding forces to supplement existing means, thus increasing the crossing potential. Installation of supplemental tactical bridging will not be under fire initially, and construction and installation can be well planned and coordinated.

The crossing area commander (CAC) is designated sufficiently early to begin extensive planning. The CAC is the designated representative of the tactical commander to control the movement of the retrograding force through the crossing area. At the division level, this may be the assistant division commander, while at the brigade, the executive officer may perform this function. Engineers, military police, and a traffic headquarters normally will be temporarily attached as his staff.

Traffic control up to and through the crossing area is a critical problem in crossing operations. For this reason, plans for movement must be detailed, and control of movement must be positive. This control is exercised by the delay force commander, the crossing area commander, and traffic headquarters.



It is the responsibility of the crossing area commander to insure the continuous and orderly flow of the retrograding elements across the river. His control extends to engineer regulating points (ERPs), which insure that vehicles are of proper class and size and that holding areas feed vehicles through the crossing area in an orderly fashion; to military police traffic control points (TCPs), which manage traffic flow; and to crossing site commanders, who are the engineers operating the crossing facilities. The crossing area commander and his staff must be intimately familiar with the commander's tactical plan to insure it is supported.

Activity within the crossing area will begin with small two-way crossings by combat service support units evacuating non-essential supplies or prestocking the delay force. During the early stages of the retrograde, existing crossing means will be supplemented by the addition of tactical bridging and the development of rafting and fording sites. The crossing area must be operational early in the retrograde in order to allow all elements of the crossing force NOT involved in the delay to cross the obstacle.

Operation of the crossing area must provide for:

- Rapid flow of traffic across the river. Planning must be extensive and execution flexible in order to allow the uninterrupted movement of troops and equipment across the obstacle. Emphasis is placed on siting crossing equipment to accommodate fluctuating quantities of friendly forces under a varying scenario of enemy actions. Units are moved across at a time and place which will accommodate the *tactical situation.*

Use of holding areas on the entry bank is discouraged if troops must mass under enemy observed fire. An area near the crossing site may be necessary to provide concealment; however, to avoid congestion, arrival of units at the crossing site should not exceed the crossing capability.

- Assurance that only essential personnel and equipment are operating in the crossing area.

- Coordinated crossing site selection to facilitate overwatch of forces withdrawing under enemy pressure. Delay forces will be used to thicken the main battle area (MBA) after they break contact and their withdrawal is coordinated with the defensive plan. Crossing site selection must conform to this plan of withdrawal and is limited only by physical river features and availability of crossing equipment.

- Coordinated crossing equipment and supplies before defenses are completed. The crossing area commander must have early decisions about defense plans in order to place crossing means in the appropriate location.

- Coordination with the delay commander to optimize use of crossing sites by delaying forces. As delay forces are disengaged, final plans for their crossing are rapidly coordinated with the defense commander. The crossing plan supports both the defensive and delay plans.

- Control of all movement to, across, and exiting from the river line. This is accomplished in close coordination with the defense commanders as they assume responsibility for the battle from the delay force. The use of holding areas on the entry bank may not be practical as the battle closes on the river line. Units that can be withdrawn from the delaying battle will be directed to cross without pause.

- Coordinated closing of crossing sites with defense commanders. When the tactical situation is such that crossing sites are no longer needed or the danger of capture out-weighs the advantages of continuing to cross personnel and equipment, the sites must be closed or destroyed. The decision on when this occurs at each site is made by the defense commander in whose area the site is located. The decision of what will be done with crossing means will be made by the crossing area commander.

Turnover of responsibility for sites from the crossing area commander to the defending force commanders is by mutual agreement or when directed by the crossing force commander. It is not essential that this hand-off be simultaneous between or within defensive sectors. When a crossing site is no longer required, it may be inactivated and removed or turned over to the defense force commander in sector. Depending upon the tactical situation, the crossing force commander may not allow crossing equipment to remain in place even though the defending force commander desires its retention.

Normally, the crossing area commander remains in command of the crossing means until delay elements have crossed the river. Control is then passed to the commander(s) of the defense force. Situations may exist where the defending commander would take over crossing sites in his area before the delay force has completed crossing the river.

As stated earlier, retrograde river crossings are not offensive crossings conducted in reverse. A retrograde river crossing combines two of the most difficult forms of combat—a retrograde and a river crossing. This requires detailed planning and skillful execution to preserve the force and punish the enemy.

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CHAPTER 5

special considerations

A river crossing is an extremely difficult operation with many vulnerable areas which can prevent its success. Chapters 3 (Offense) and 4 (Retrograde) have presented major tactical, planning, and control concepts which are required for the success of a river crossing operation. This chapter expands on the concepts previously described, elaborating on areas which require special consideration to insure the success of a tactical river crossing.

Hasty crossings are made whenever the forces come to an obstacle—day or night. Deliberate crossings are made either during the day or night, but most often during the day. The purposes of a night river crossing are to obtain surprise, maintain momentum of the attack, and to conceal offensive or retrograde operations at the riverline. A night river crossing may be required when the enemy has air superiority over the crossing area. Open terrain which lacks cover and concealment generally favors a night attack. When making a decision on whether to cross at night, the advantages are weighed against the *significant* disadvantages of increased confusion and the overall decrease in efficiency.

NIGHT OPERATIONS

A night crossing usually begins under blackout conditions. The assault elements of the crossing force, using night vision devices, attempt to cross the water obstacle by stealth, land on the exit bank, and advance toward the initial objective(s) as rapidly as possible. Once the assault forces have eliminated enemy small arms fire at the crossing site, and provided that friendly air superiority is maintained, subdued artificial lights may be used to expedite further crossing operations.

After assault forces have cleared the exit bank to a point where the crossing site is no longer vulnerable to observed enemy artillery fire, high intensity artificial illumination may be used to speed the construction of rafts and bridges. At the same time, crossing site entry and exit points can be illuminated for safety and swift crossing. Speed in making the crossing is of great importance because daylight may expose the bridgehead to enemy observation and allow the enemy to attack forces in the bridgehead by fire and/or maneuver.

When planning either a hasty or deliberate crossing under blackout conditions, the amount of *natural* (ambient) *light,* the availability of *night vision devices,* and the use of *artificial illumination* are considered. This information is contained in the crossing plan. The best natural light condition is a quarter-moon positioned behind the assault units. A moon location behind the attacker illuminates terrain to his front while reducing the defender's ability to see the attacker. The use of artificial illumination is carefully timed and incorporated with the assault to preclude premature dislocation of activities.

It must be remembered that visual concealment is only one method of obscuring operations. Consideration must also be given to reducing the effectiveness of the enemy's electronic and technical surveillance means.

While surprise may be gained by night crossings, more control and coordination is required to permit effective movement. Measures are incorporated to prevent vehicle concentration and accidents. Site preparation and raft/bridge assembly require more time at night. A 50 percent increase is the average planning figure for blackout conditions; however, well-trained troops may reduce this to 20—30 percent. Commanders weigh the advantages of surprise against the possible reduced speed and control associated with night operations.

Three general concepts exist for night crossing operations:

- **Begin crossing operations at dusk and continue through the night.**
- **Conduct entire crossing during night.**
- **Begin crossing operations before dawn and continue through the day.**

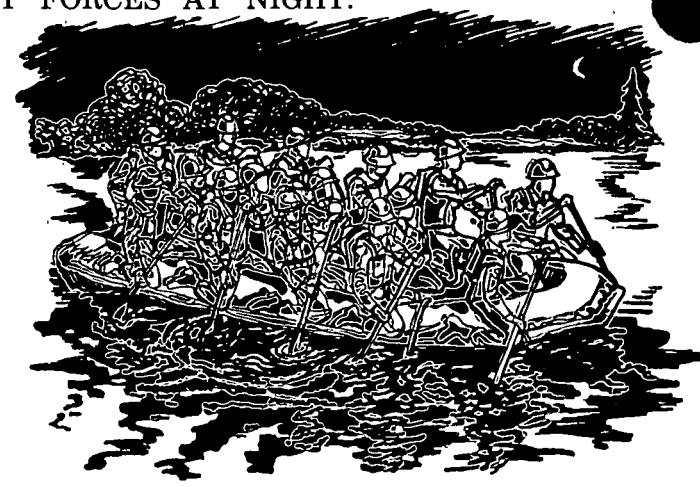
Initiating crossing operations near evening civil or nautical twilight allows initial assault forces to cross and engineer site preparations to begin prior to total darkness. Initial exit bank objectives may be secured and traffic control posts established to enhance further attacks when larger forces, using rafts and bridges, cross after darkness. When these measures are incorporated with deception operations, even though the enemy might detect the assault, he may be deceived as to the actual crossing locations and/or the extent of the operation. Even though the movement and crossing rate of assault forces using rafts and bridges is less than in daylight, the most time-consuming activities (i.e., preparing crossing sites and seizing close-in objectives) are begun under better visibility conditions.

Conducting the entire operation during darkness in conjunction with a deception operation has a greater probability of deceiving the enemy once a crossing operation is underway. Once detecting the assault, the enemy will have increased difficulty in disrupting or defending against the assault.

Beginning the operation prior to morning nautical or civil twilight increases the probability of an undetected assault or crossing locations and permits maximum combat power to be applied at the earliest light and continued through daylight. Compensations are made for increased site preparation time, the initial assault during darkness, and the enemy's ability to respond during daylight.

Commanders select a concept that best supports the tactical plan.

CROSSING ASSAULT FORCES AT NIGHT.



Dismounted infantry cross in 15-man assault boats. Assisted by the engineer crew, infantrymen use boat paddles for silent crossings or outboard motors when more noise is permissible. Mechanized infantry make their crossing in *M113* armored personnel carriers. Where the river depth permits, tanks ford the river to add momentum to the attack. Bridges, seized or installed, increase the rate of crossing. Whatever crossing method is used, personnel and equipment operators require a means of guiding or marking the desired route.

MARKING ENTRANCES, EXITS, AND ROUTES.

During night crossings, entrances and exits are marked by lights, ropes, or other means that crossing personnel or equipment operators can easily detect. To assist in maintaining direction, illuminated or readily identifiable reference points are established on the exit bank.

Illumination aids include:

- **Flashlights (with or without filters).**
- **Vehicle lights.**
- **Tank-mounted searchlights.**
- **Aiming post night lights.**
- **Chemiluminescent compounds.**
- **Weapon fires.**

As additional navigational aids, lighted or illuminated floating markers, overhead rope or wire, or luminescent tape may be used.

To aid the assault force, organic **active** (infrared) and **passive** (image intensification) night vision devices are used.

Active night vision devices include:

- **Infrared weapons sight.**
- **Image metascope.**
- **Electronic binolulars.**
- **M18 infrared binocular (tank kit).**
- **M24 infrared driver's periscope (tank kit).**
- **M32 infrared periscope (tank kit).**

Passive devices include:

- **Miniscope (lightweight for individual soldier).**
- **Starlight scope (small arms weapon sight).**
- **Crew – served weapons night vision sight.**
- **Tripod-mounted night vision sight.**

Personnel using the hand-held night vision devices should secure them to avoid losing them in the water.

Amphibious vehicles, equipped with infrared headlights and operated by drivers equipped with electronic binoculars, may be used in the assault. Personnel on the exit bank, equipped with a metascope (fig 5—1) or other infrared signaling devices and the electronic binocular (fig 5—2), act as guides for amphibious crossing vehicles. Guides signal to similarly equipped assault boats or swimming vehicles. Succeeding elements cross in a similar manner until the tactical situation permits methods of greater illumination.

GUIDING THE ASSAULT/SWIMMING EQUIPMENT.

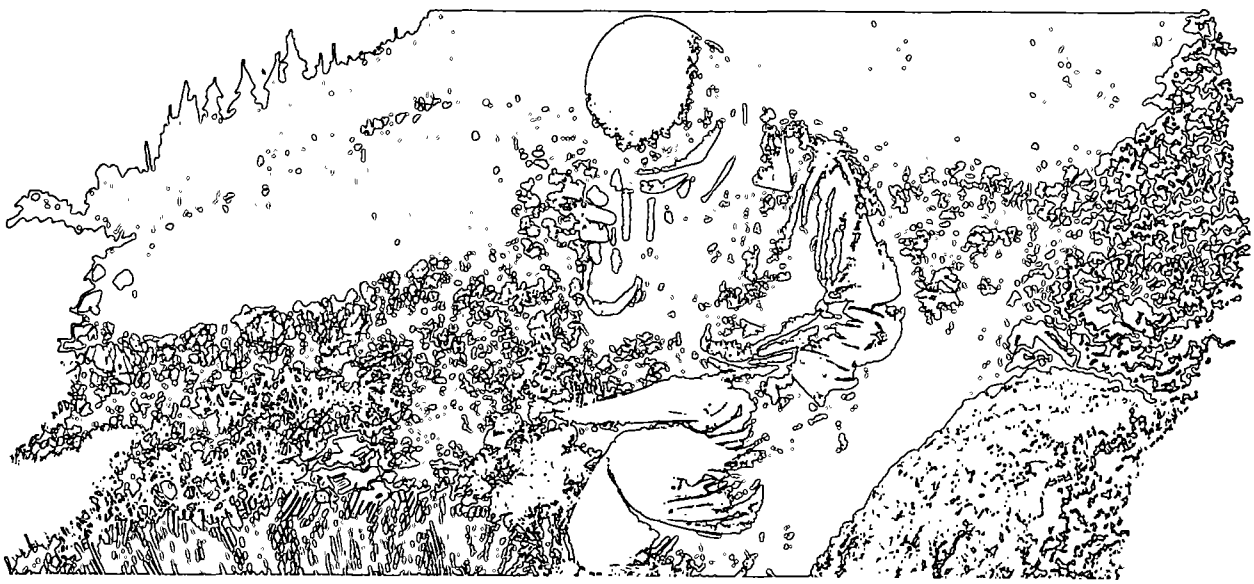


Figure 5—1. Image metascope, infrared

Figure 5—2. Binocular, electronic AN/PAS-6

Army aircraft may be used to airdrop or airland critically needed supplies into the bridgehead or to airland personnel on the exit side of the river. During night crossings, night operating aids are used to guide aircraft to landing zones (e.g., by placement of four lights, one at each corner of the usable landing area). If other lights are visible in the bridgehead, these marking lights should be colored to distinguish them from the others. Flare pots are seldom used because the rotor downwash usually extinguishes them. The layout of a field expedient heliport night-landing system is shown in fig 5—3.

At the time of approach for landing, a ground operator, standing upwind from the landing site, flashes a coded signal to the pilot by means of a signal lamp, flashlight, vehicle lights, or other means agreed upon. The signal is repeated until recognition is assured. The ground operator then directs his beam of light downward along the ground to bisect the landing area. The pilot makes his approach for landing toward the source of the beam of light and lands at the center of the marked area.

All lights are displayed for a minimum time and are extinguished immediately after the landing. Usually, the pilot can take off without lighting assistance. When lighting is required, the lights are turned off immediately following his departure. Two-way radio contact is maintained, when the tactical situation permits, between the pilot and ground contact team during approach. The pilot can be requested to turn on his rotating beacon momentarily to identify his aircraft and confirm his position. Under adverse conditions, frequency modulated (FM) homing procedures can be used.

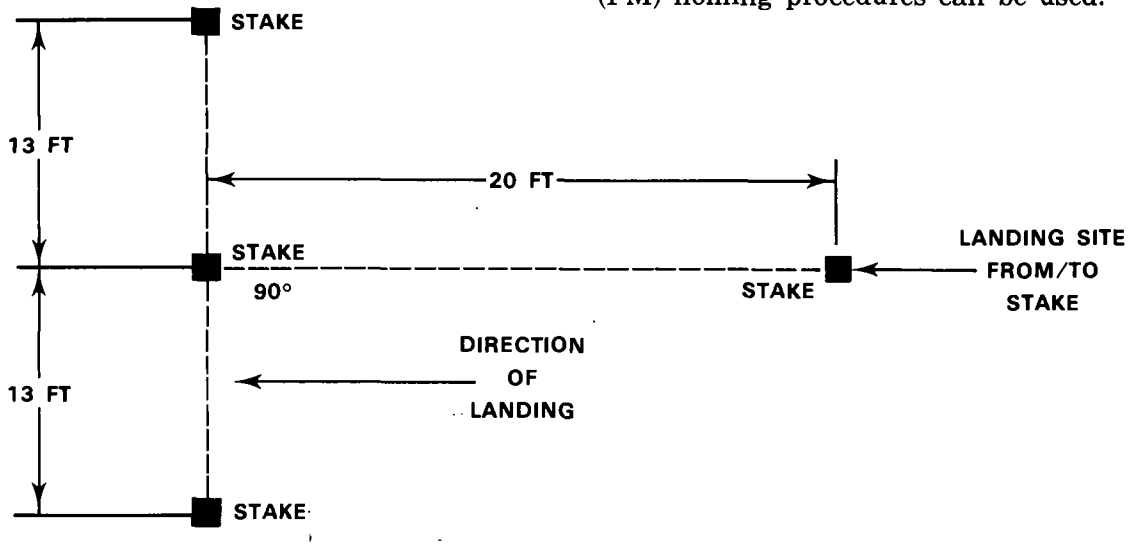


Figure 5—3. Layout of field expedient heliport night-landing system

ENGINEER CAPABILITIES FOR NIGHT CROSSINGS.

Engineer elements use night vision aids and modified daylight techniques at night. Night vision equipment is not available for all personnel and equipment in engineer units. Authorized night vision equipment should therefore be strictly controlled by engineer elements having a mission-essential task to perform during the hours of darkness. Night vision equipment not authorized by engineer units, but needed by them for mission-essential tasks, is obtained from the division support or other logistical command.

During night operations, worksites are flooded with high-intensity infrared light from searchlights mounted on accompanying tanks, Combat Engineer Vehicles (CEVs), or ¼-ton vehicles. Using this light source, engineer personnel equipped with electronic binoculars remove obstacles, prepare entry/exit slopes, and commence assembly. Where a high intensity light source is not available or where stealth is required, engineer or other personnel equipped with electronic binoculars work in pairs, using metascopes or other hand-held infrared light devices.

RAFTING AND BRIDGING OPERATIONS.

Engineer units erecting rafts and bridges at night use the same assembly techniques as in daylight. When combat conditions permit, the bridge site is lighted with visible light. Luminescent lane and bridge limit markers are used to the maximum extent to guide vehicle operators in crossing. When combat conditions dictate that the bridge must be erected under hours of darkness, engineer units use night vision aids including infrared searchlights. These searchlights, mounted on CEVs or on ¼-ton trucks, light the bridge site with high intensity light. The infrared light source from a metascope or other hand-held infrared light device is used for close or exacting work in areas where the beam of the searchlight is obscured.

The engineer officer in charge on the entry bank exercises overall control and direction, using a tripod-mounted night observation device (NOD) for infrared viewing. Heavy equipment, such as dozers, cranes, graders, and bridge erection boats, are equipped with infrared filters on their headlights, and the operators use driving binoculars.

Nighttime construction of a mobile assault bridge (MAB) is also accomplished using the same assembly techniques as in daylight. Each mobile assault bridge unit vehicle is equipped with infrared filters on the headlights. The driver and the vehicle commander wear electronic binoculars for infrared viewing. During a night river crossing operation, dozers and operators equipped with night vision devices precede the MAB vehicles to the entry bank, clear any obstructions, and prepare the necessary river entrances. Upon becoming waterborne, the MAB vehicles are assembled as rafts or a bridge. A metascope or other hand-held infrared light source is used for detailed assembly of the MAB units. When MAB units are used for rafting, infrared searchlights mounted on ¼-ton vehicles are used to floodlight the loading area and facilitate the loading operation. The first vehicle to cross is a dozer or a CEV which is landed on the far shore for exit site preparation. An infrared-equipped ¼-ton truck may also be used on the exit bank to provide a high-intensity light source for loading and unloading MAB rafts.

EFFECTS OF WEATHER ON DEVICES.

Generally, the effect of weather on night vision, target acquisition, and surveillance devices varies according to the specific environmental phenomenon and the type of devices used. Within the area of operation, the weather between daylight and darkness can change completely. Fog, dust, smoke, or rain will diffuse or scatter infrared radiation and reduce its range. Heavy clouds can adversely affect infrared sensor imagery. Heavy rain and heavy clouds can reduce radar ranges. Heavy rains also restrict the use of acoustic equipment, and strong winds cause such equipment to become totally ineffective. Heavy overcast degrades the effectiveness of image intensification and illumination devices. Moonlight and starlight, or their absence, directly affect image intensification devices. Abrupt temperature changes affect the batteries of night vision devices in much the same way as they affect radio batteries.

COMMUNICATIONS

In a river crossing, reliable communications are necessary for continuous coordination and for efficient employment of the large number and variety of supporting units peculiar to this type of operation. All available means of signal communication may be required to insure reliable contact.

The geographical distribution of radio nets associated with river crossing operations and their peculiar communication patterns can provide significant indicators of plans and preparations for these operations. Therefore, special emphasis should be placed on signal security and electronic countermeasures throughout operations. The enemy must be denied the information that he needs to react effectively and in strength against the crossing force when it is vulnerable. Enemy attempts at disrupting command and control by degrading communications through electronic countermeasures must be defeated by applying sound communications security practices. Electronic warfare is discussed in **FM 71—100, FM 24—1,** and **FM 32—20.**

Communication planning is continuous and concurrent with tactical planning. The communication plan is developed to support the scheme of maneuver and should provide for the use of multiple means. Communication orders are published in the communications-electronics directives (CEOI or ANNEX to OPORD). Plans must include provisions for the use of and defense against electronic countermeasures. Specific instructions are normally set forth in electronic warfare directives; if not published, they are included in communications-electronics directives.

Prior to a deliberate (offensive and retrograde) crossing, the use of radio may be restricted to permit security and surprise. Initially, maximum reliance will be on wire communication supplemented by

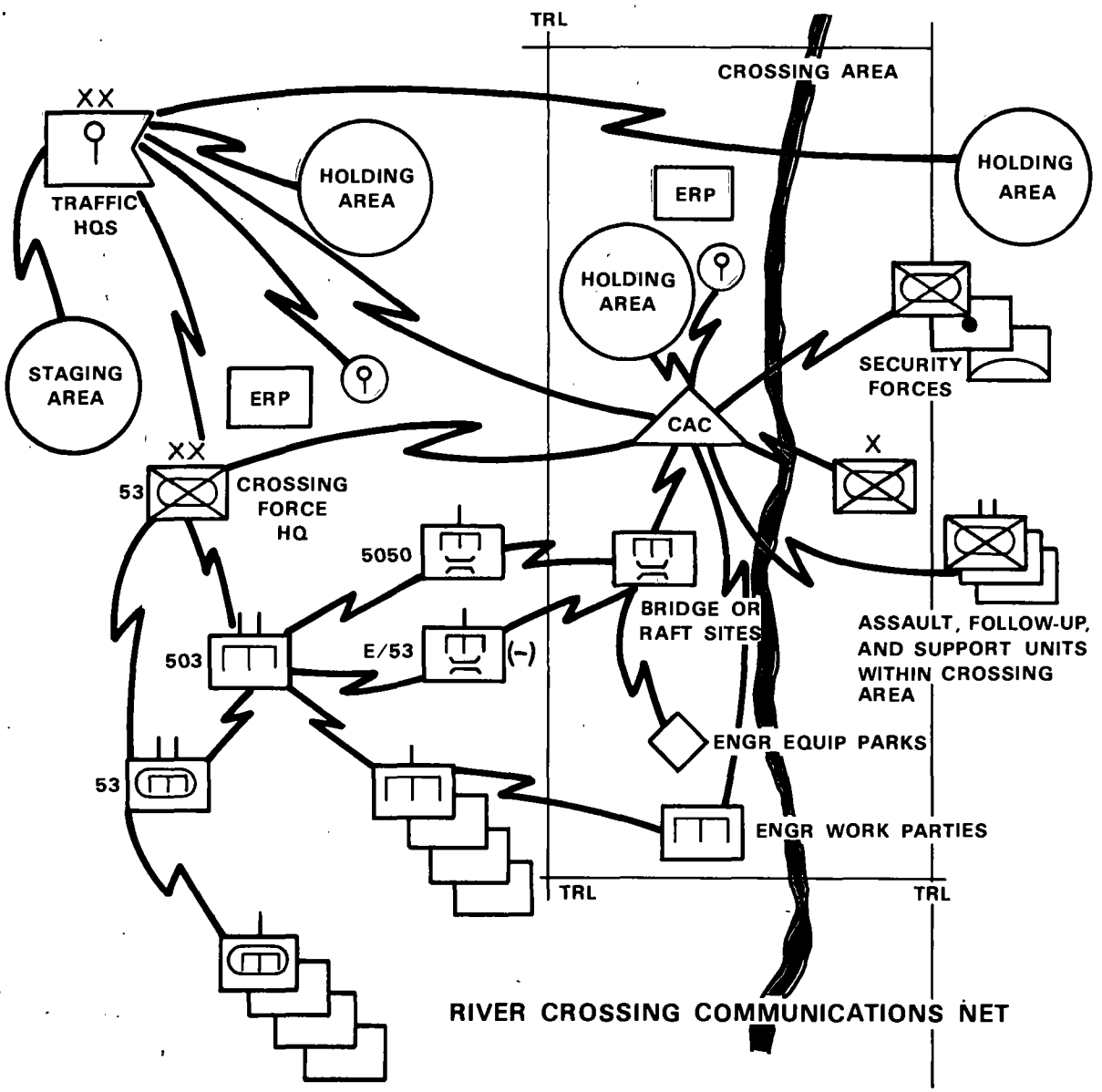
messenger. After the operation begins or during a hasty crossing, greater reliance must be placed on radio, visual, and sound communications within the crossing area during the assault. As soon as operations on the exit bank permit, brigade signal teams and forward area signal centers are expeditiously deployed across the river to extend command and control communication nets. **FM 24—1** contains further discussions of combat communications.

Communications requirements in the retrograde will be compounded when the deception requires a notional mission portrayal. Units, such as the engineers and military police that will have increased communication traffic during this type of operation, must establish and maintain fictitious radio and wire nets and must also maintain communications in the crossing force command net. Planners must note that these units also will not have the equipment necessary to operate these nets efficiently unless supplemented from outside sources.

SPECIAL COMMUNICATION REQUIREMENTS.

Communications are established and maintained between the crossing area commanders and:

- Crossing sites.
- Security forces.
- Engineers.
- TCPs in the holding areas.
- Assault, follow-up, and support units within the crossing area.
- Crossing force headquarters.
- Traffic headquarters.



RIVER CROSSING COMMUNICATIONS NET

The division signal battalion provides communication equipment support for the crossing area commanders. However, supplementary signal support may be required.

Although divisional engineer units probably will be able to operate efficiently using only organic communications equipment, corps engineer combat units must receive additional signal support in order to maintain radio communication with the crossing area commander (CAC) and the engineer regulating points (ERPs). Military police elements operating traffic control posts can, with organic equipment, perform their normal function of traffic control. These elements may require equipment support to maintain contact with traffic headquarters in monitoring the movement of traffic.

COMMUNICATION MEANS

Wire Communications. Wire should be used as extensively as conditions permit. Units establish and operate wire facilities when feasible. Normally, sufficient telephone circuits exist between the forward area signal centers and the division main by means of radio relay. Wire circuits are extended from the forward signal centers to provide direct access from the division crossing force and traffic headquarters to the defend force and crossing area commanders and to key TCPs at holding areas and crossing sites. If time permits, lateral lines are established between fixed TCPs and crossing area commanders, providing greater reliability through alternate routing.

Wire is extended across the river at the earliest practicable time in the offense. Wire teams from higher headquarters augment the division wire capability to install an extensive wire system.

In the retrograde, wire will be a primary means during the initial build-up in the crossing and defense areas to preclude compromise of the deception objectives.

Radio Communications. Special movement control radio nets serve as a primary means to control and coordinate the crossing of units during the assault and retrograde. Examples of special nets follow:

- **Crossing area commander's net (FM)**—this net should include the crossing sites within the crossing area, traffic control points, engineer units, defending brigade units, and major crossing units that enter the net while in the crossing area.

- **Division movement control net (FM)**—traffic headquarters acts as the net control station. Operating within the net are the division TOC, the crossing area commanders, and the TCP in the assembly areas.

Messenger Service. The crossing area commander's OPCON engineer, military police, and local security elements are included in the scheduled messenger service. Special motor and air messengers should be available for direct priority communications that cannot be transmitted electronically.

COMBAT SERVICE SUPPORT

Responsive and uninterrupted combat service support is difficult in any combat operation. In river crossing operations, assault forces are separated from their support elements by the river. It is therefore necessary to emphasize continued service support while minimizing congestion in the crossing area. Combat service support planning considers the increased requirement of river crossing operations.

Planners anticipate and plan to counter:

- The effects of losses of supplies, equipment, and key personnel.
- Delays in rafting operations and bridge construction.
- Enemy interference with both surface and air movements in rear areas and in crossing area.
- Competing priorities for limited road space.

Maintenance is intensified in preparation for crossings. Maintenance support teams should be available in crossing areas to accomplish emergency equipment repairs to minimize delays. Communication equipment and weapons require additional maintenance efforts. River crossing operations also require special considerations for supply, medical support, and transportation means.

Offensive river crossing operations require that the combat service support installations be echeloned forward to support the operation for the maximum time without displacement after the attack is launched. Support then can be given continuously to maintain the momentum of the attack.

In the retrograde, combat service support installations will be echeloned to the rear in support of the delay, defend, and crossing area forces. Initially the displacement considers the deception plan requirements. Support is continuous; however, detailed plans include prestock points for use as the delay forces move to the rear. The principal consideration in locating the combat service support installations is the ability of the individual installations and activities to perform their assigned missions. After that, dispersion and defensibility are considered. Defensibility is balanced against the dispersion necessary to prevent simultaneous destruction of adjacent facilities. Although dispersed logistic installations do not normally present lucrative targets for nuclear or chemical weapon attacks, these installations habitually employ passive defense measures to reduce exposure and vulnerability to such attack. These passive measures include:

- Dispersion between installations—consistent with the ability to perform assigned missions and to satisfy requirements of local defense and passive air defense.
- Cover and concealment—taking maximum advantage of terrain. **FM 54—2** and **FM 100—10** provide further details of combat service support procedures and responsibilities.

Supply Planning. Critical supplies, when required by the fighting elements, are delivered to forward distribution points (e.g., in the offense to the exit bank of the river). In the early stages of the operation, airlift may carry much of the supply tonnage to distribution points already established. Aircraft may be used to deliver supplies forward across the river or to airdrop supplies into the bridgehead. Additional supplies can be transported across the river by assault boats, rafts, or amphibious vehicles; supply can be accomplished through the use of preloaded vehicles that cross by air, raft, or bridges as soon as practicable after the initial assault. In the retrograde, supplies are positioned to support the delaying forces. Aircraft are used to maintain required levels and to remove excess supplies across the water.

Plans provide for:

- Early establishment of supply storage areas or distribution points and means for their control on the exit bank.
- Increased quantities of Class V for preparatory fires and the assault.
- Units crossing the river with basic loads intact.
- A high priority in movement plans for ammunition supply vehicles.
- Increased ammunition expenditures for weapons employed for air defense.

- Establishing ammunition supply points on the exit bank early in a river crossing operation.

- Providing minimum stock levels of critical supplies adequate to insure continued operation if traffic is interrupted when crossing the river.

- Early establishment of stock levels to support further offensive operations.

- Prompt relief in critical supply situations that may occur.

- Reserve engineer equipment necessary to insure continued operation of the vital river crossing means.

- Placement of reserve stocks of engineer bridging material in equipment parks near bridge and raft sites.

- Prompt establishment of one or more petroleum, oil, and lubricants (POL) distribution points in the bridgehead.

- Providing high priority for mobile fuel tankers in crossing the river on rafts or bridges, as appropriate.

- Temporary small-diameter pipeline and hoseline systems to serve the far bank.

- The increased requirement for repair parts associated with equipment used in swimming and fording operations.

Medical Support. All medical personnel organic to units crossing the river cross with their supported units. Combat battalion aid stations are established in the bridgehead as early as possible to provide treatment and reduce cross-river evacuation. Division medical battalion ambulances accompany medical platoons of the assault battalions when feasible to expedite evacuation. Designated boats, rafts, amphibious vehicles, and aircraft evacuate patients to far-shore treatment stations.

Division clearing stations and supporting hospitals are sited to cross the river as early as practicable. Clearing stations may be displaced by echelons. Control of division-level medical operations is initially decentralized to supported brigades, but reverts to the medical battalion as soon as communications and rear area protection permit. The clearing stations prepare to care for an overload of patients pending the resumption of normal evacuation of supporting medical treatment facilities. **FM 8—15** contains general medical considerations.

PRISONERS OF WAR

Control. Division prisoner of war collecting points normally are established on the entry bank of the river. These are established far enough to the rear to prevent interference with combat operations and river line activities before and during operations. Division military police may establish forward brigade and task force temporary collecting points on the exit bank immediately following the assault. Available empty transportation returning from the exit bank is used to evacuate prisoners of war from the bridgehead or forward temporary collecting points.

Interrogation. On-the-spot interrogation of enemy prisoners of war and refugees by military intelligence interrogators and counterintelligence personnel can provide information of immediate tactical value to the crossing unit. Normal evacuation and interrogation procedures are interrupted only while main division prisoner of war collecting points are crossing to the far side of the river. See **FM 19—1** and **FM 19—40.**

SMOKE

Smoke may be used to conceal preparations for the crossing, the crossing itself, and to assist in the deception plan. Skillful use of smoke confuses the enemy and may cause him to shift his fires and/or to commit his forces against areas other than the principal crossing sites. Smoke may be used in conjunction with feints and demonstrations to conceal the forces involved or to present an appearance of an activity that does not actually exist. Smoke screens may be used to divert enemy attention and draw fire. When deception is desired, the density and extent of the smoke to be maintained equals that employed in the actual area of operations. Smoke is considered for use at night to degrade the effectiveness of the enemy's night observation devices.

OBSCURE ENEMY OBSERVATION.

Smoke may be used to obscure enemy air and ground visual observation of:	
• Troop and equipment assembly areas.	• Crossing sites.
• Weapon positions.	• Objectives to be secured by air-mobile assault.
• Combat service support installations.	• Ambush sites.
• Crossing means.	• Withdrawal from ambush sites.

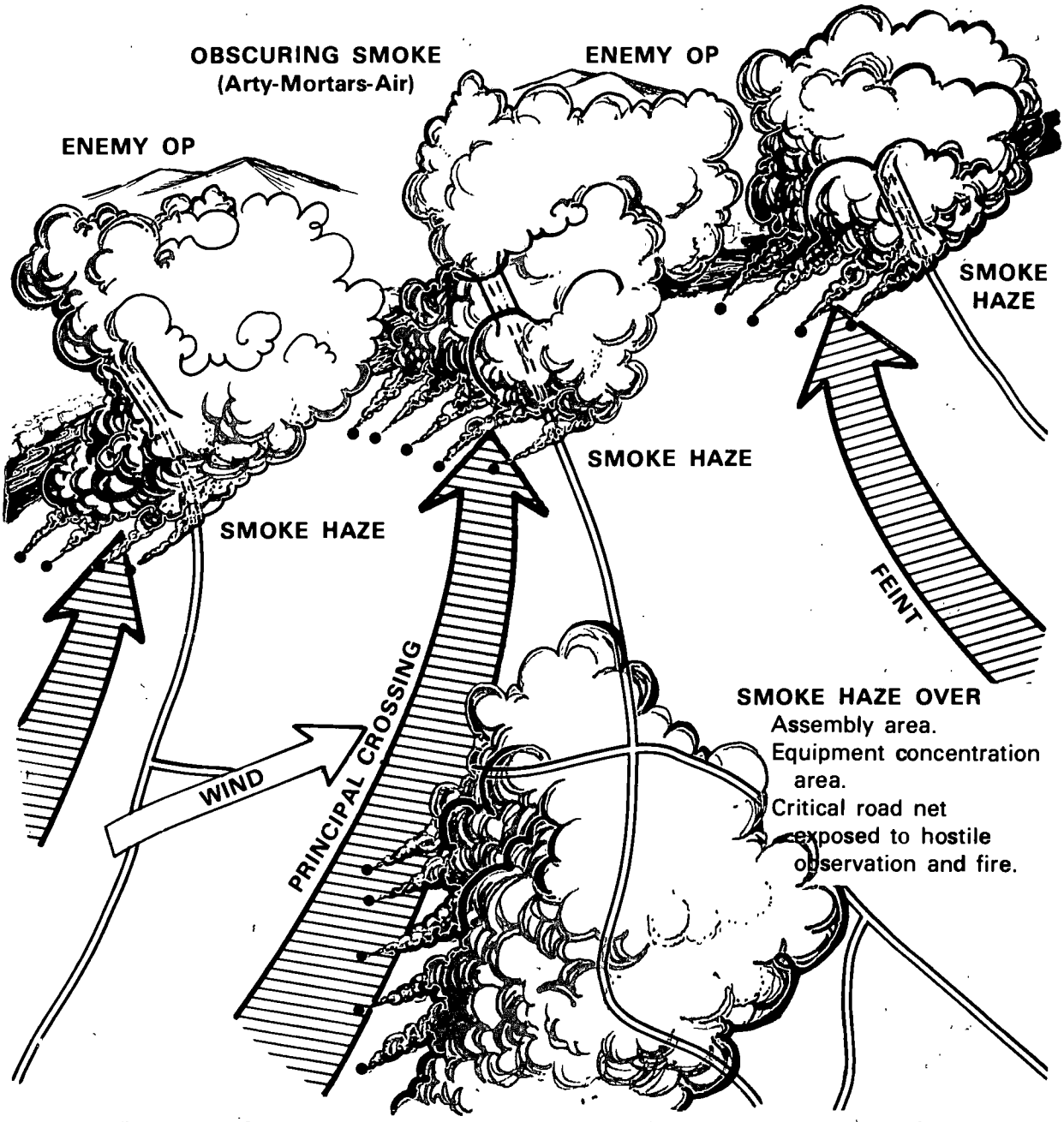


Figure 5—4. Smoke screens used for concealment and to deceive the enemy as to the exact location of the offensive crossing.

When enemy air attack is unlikely, a smoke curtain between friendly and enemy forces may be sufficient if it entirely obscures enemy ground observation. If the enemy can observe a large area, a haze may be required. When air attacks are likely, a heavy smoke blanket may be necessary, but the effect of haze should not be discounted. Smoke attenuates the thermal effect of nuclear bursts; therefore, an increased use of smoke may be necessary during active nuclear warfare. (See **FM 3—50** for smoke operations.)

FACTORS IN USE OF SMOKE.

Factors considered in using smoke follow:

- Adverse weather conditions, especially high winds, may nullify the use of smoke. The commander needs accurate weather forecasts. Smoke generators, smokepots, and artillery concentrations are sited to take maximum advantage of prevailing and predicted winds on actual and dummy crossing sites.

- The size of the area covered by smoke should exceed that actually required for the preparation and operation. Smoking small areas may assist the enemy in massing artillery fires and directing air strikes on likely areas concealed by smoke. Smoking large areas serves to confuse the enemy as to the intended site of the crossing and permits maximum dispersion.

- Demands of friendly ground and air observation may conflict with the need for denying the enemy observation. Target areas for airstrikes and landing areas for airmobile forces should be clear of smoke at the right times.

- Smoke can inhibit friendly activities (i.e., brigade construction, troop or vehicle movement).

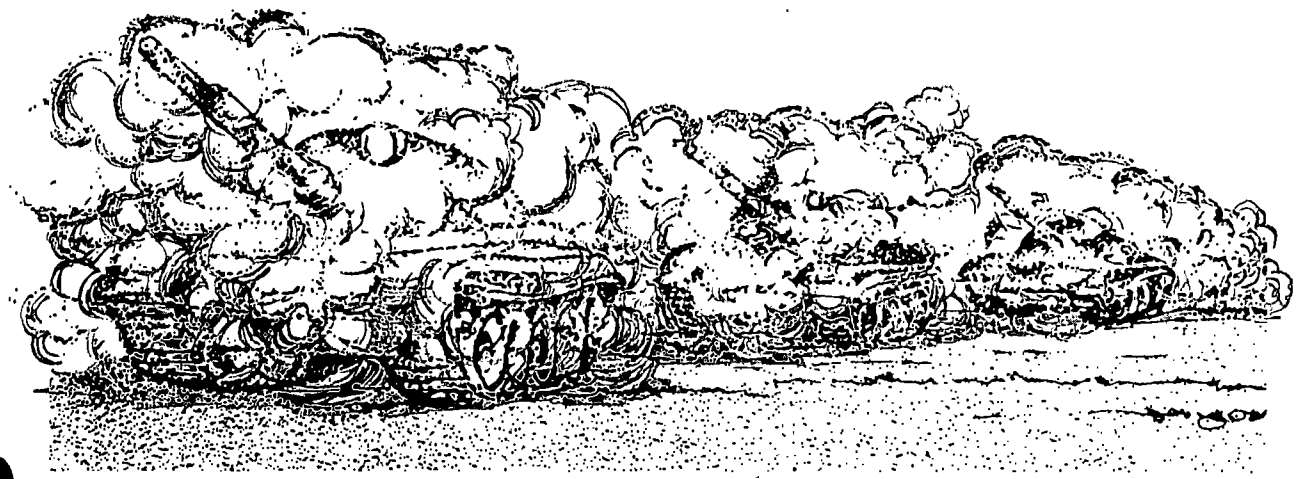
- Minimal interference with operations of friendly flank units.

- Means for offensive area screening should be established early on the exit bank.

- Enemy's reactions to the smoke and his resulting countermeasures should be observed and considered.

- Adequacy of the smoke is determined by periodic checks from the air. Air observation and also prepositioned ground reconnaissance elements (e.g., long-range patrols) are effective means for checking haze-type smoke.

- Smoke reduces the chances of organized movement to the crossing sites by retrograding forces.



APPENDIX A

references

RELEVANT STANAGS

2010	Bridge Classification Markings
2014	Operations Orders
2015	Route Classification
2017	Orders to the Demolition Guard Commander and Demolition Firing Party Commander
2019	Military Symbols
2021	Computation of Bridge, Raft and Vehicle Classification
2088	Battlefield Illumination
2163	Vehicle Weight and Dimension Card
2805A	Minimum Fordability and Flotation Requirements for Tactical Vehicles and Guns

FIELD MANUALS (FM)

3—50	Chemical Smoke Generator Units and Smoke Operations
5—1	Engineer Troop Organizations and Operations
5—34	Engineer Field Data
5—36	Route Reconnaissance and Classification
5—100	Engineer Combat Operations*
6—20	Fire Support for Combined Arms Operations
8—15	Medical Support in Divisions, Separate Brigades and Armored Cavalry Regiment
19—1	Military Police Combat Support, Division and Separate Brigade

*To be published.

19—4	Military Police Combat Support, Theater of Operations
19—40	Enemy Prisoners of War and Civilian Internees
24—1	Tactical Communications Doctrine
30—40	Handbook on Soviet Ground Forces
30—102	Opposing Forces Europe
32—30	Electronic Warfare, Tactics of Defense
44—1	US Army Air Defense Artillery Employment
54—2	The Division Support Command and Separate Brigade Support Command
71—100	Armored and Mechanized Division Operations*
71—101	Infantry, Airborne and Air Assault Division Operations*
90—2	Tactical Deception
90—13—1	Safety Aspects of River Crossing*
100—5	Operations
100—10	Combat Service Support
100-15 (TEST)	Larger Unit Operations
101—5	Command and Control of Combat Operations*
101—20	United States Army Aviation Planning Manual

TECHNICAL MANUALS (TM)

5—210	Military Floating Bridge Equipment
55—450—11	Helicopter External Loads

TRAINING CIRCULARS (TC)

100—33	Tactics of Electronic Warfare*

*To be published

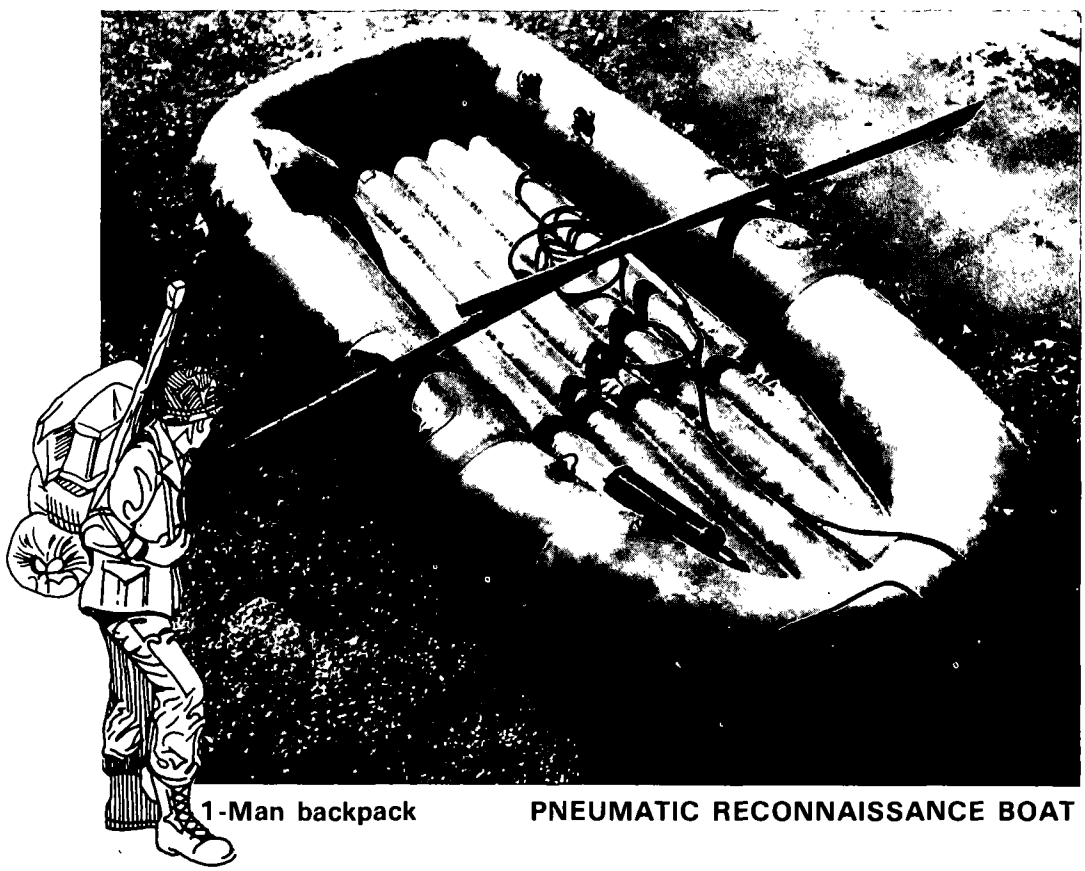
CONTENTS

Pictorial Review B—1
Tables B—10

APPENDIX B

crossing means

This appendix supplements a general description of crossing means discussed in chapter 3. It provides a pictorial review and equipment capability tables useful in selecting crossing means and planning crossing operations.



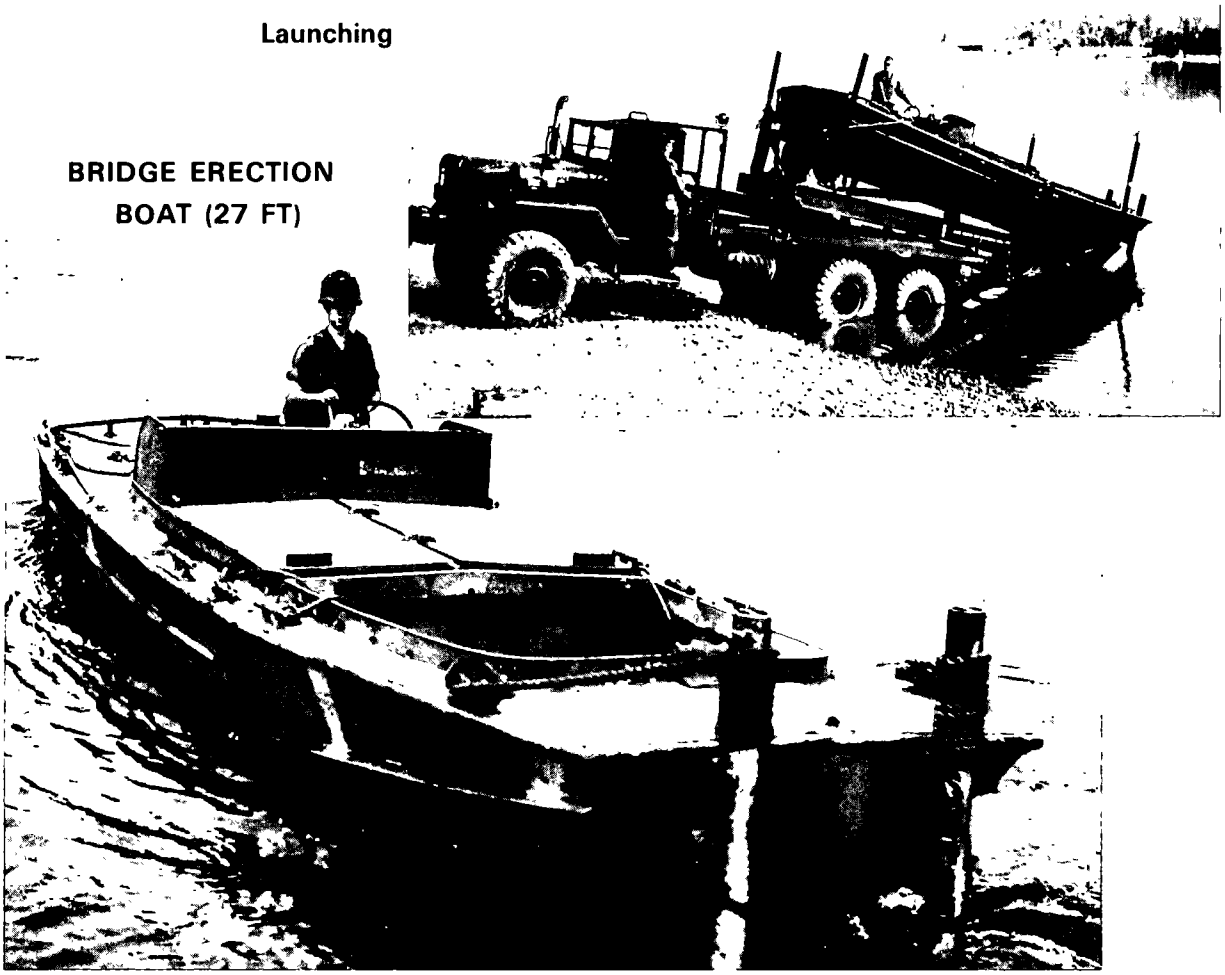
1-Man backpack PNEUMATIC RECONNAISSANCE BOAT (3-MAN)

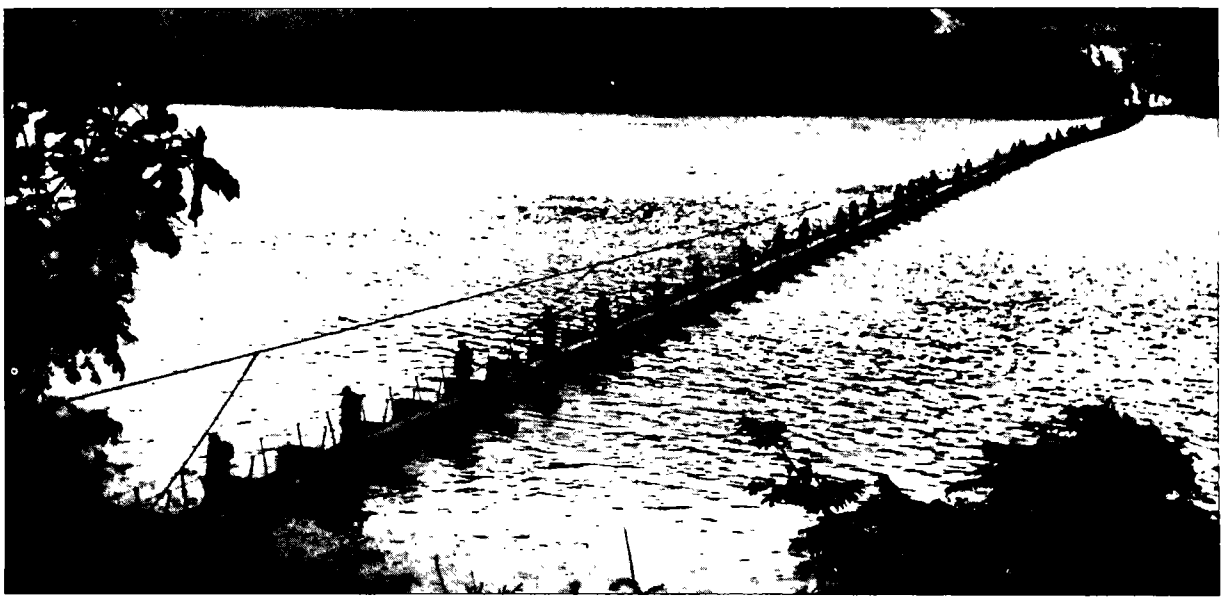
PNEUMATIC ASSAULT BOAT (15-MAN)

ARMORED PERSONNEL CARRIER (M-113)

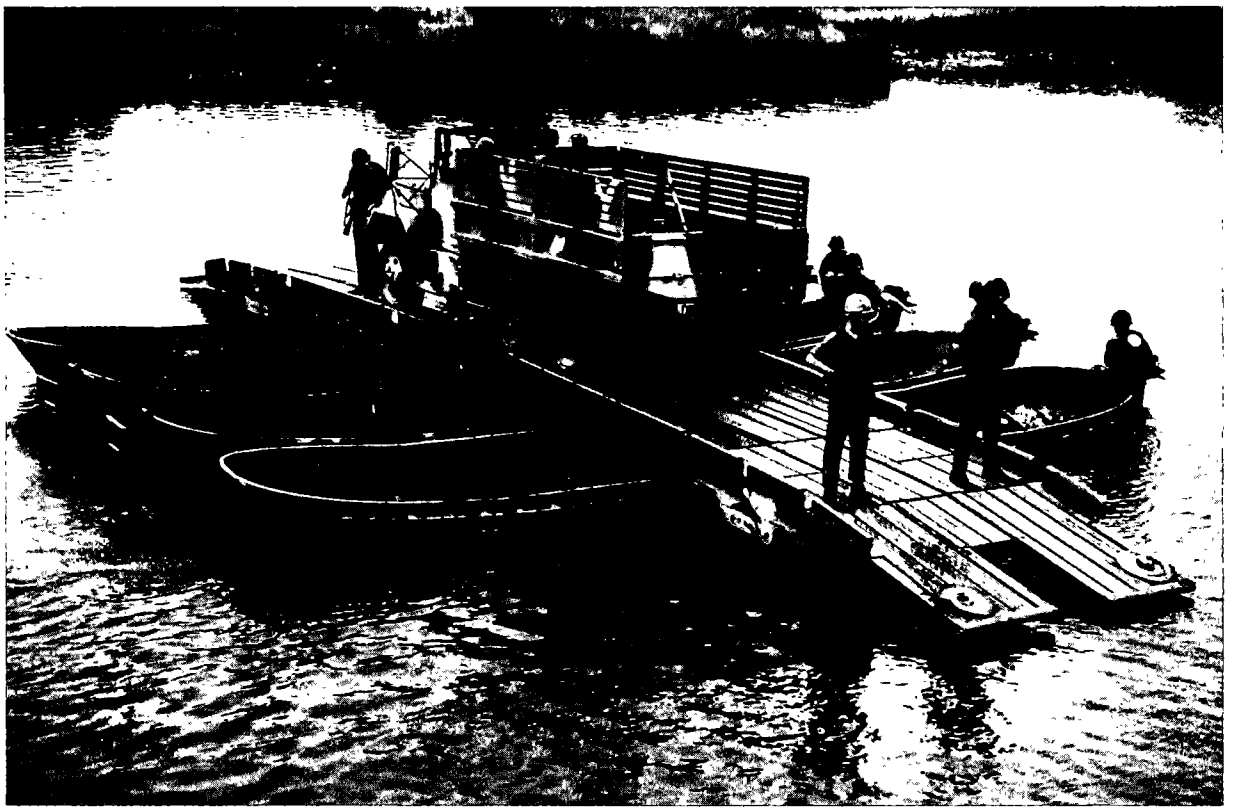
Launching

BRIDGE ERECTION BOAT (27 FT)



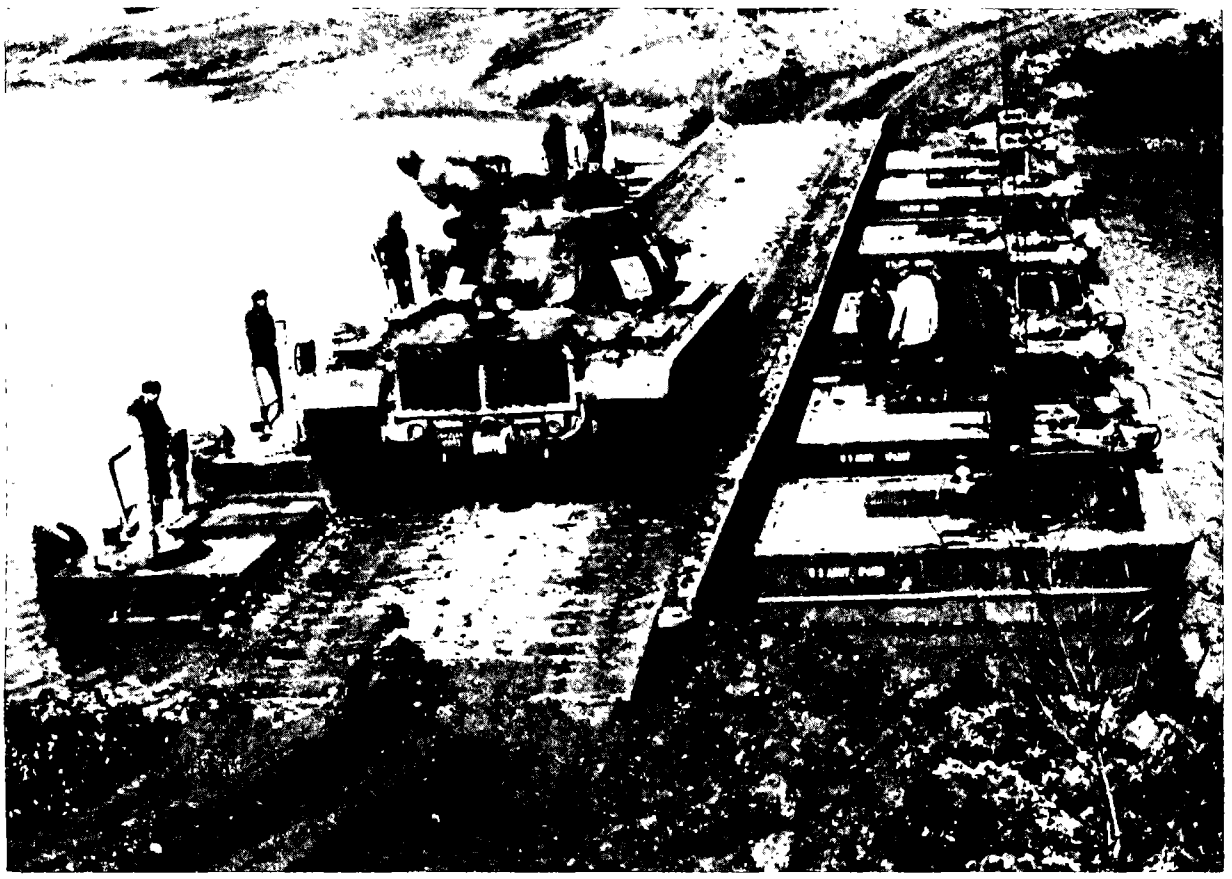


ALUMINUM FOOTBRIDGE



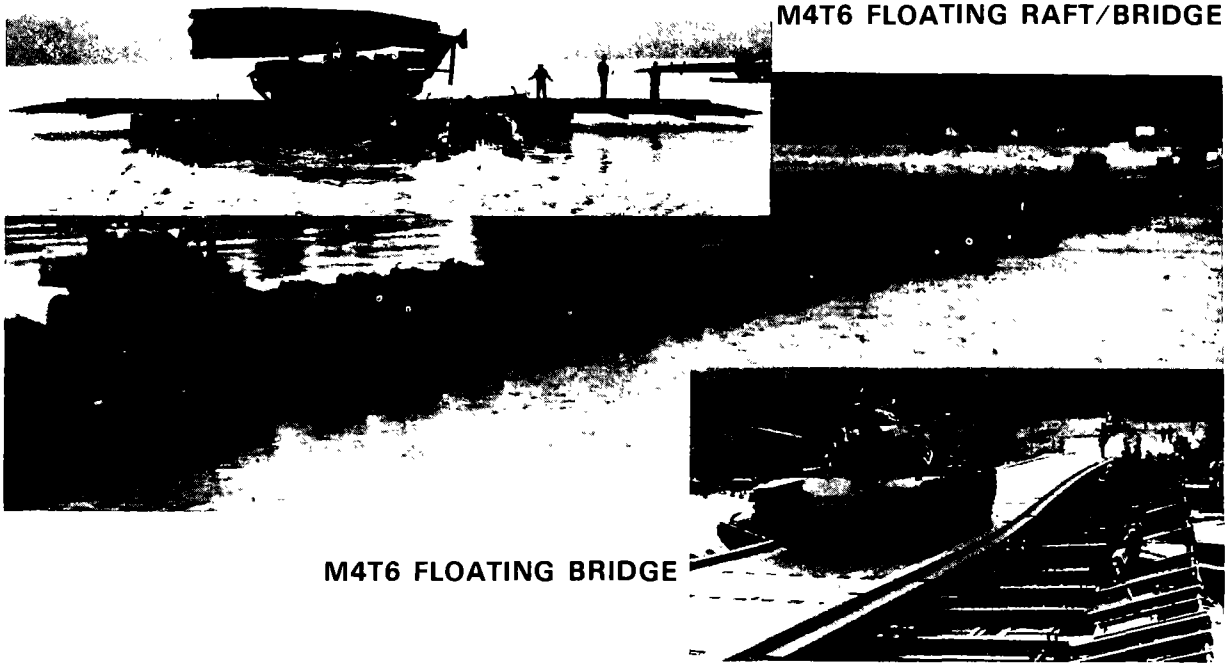
LIGHT TACTICAL RAFT (LTR)

MOBILE ASSAULT RAFT

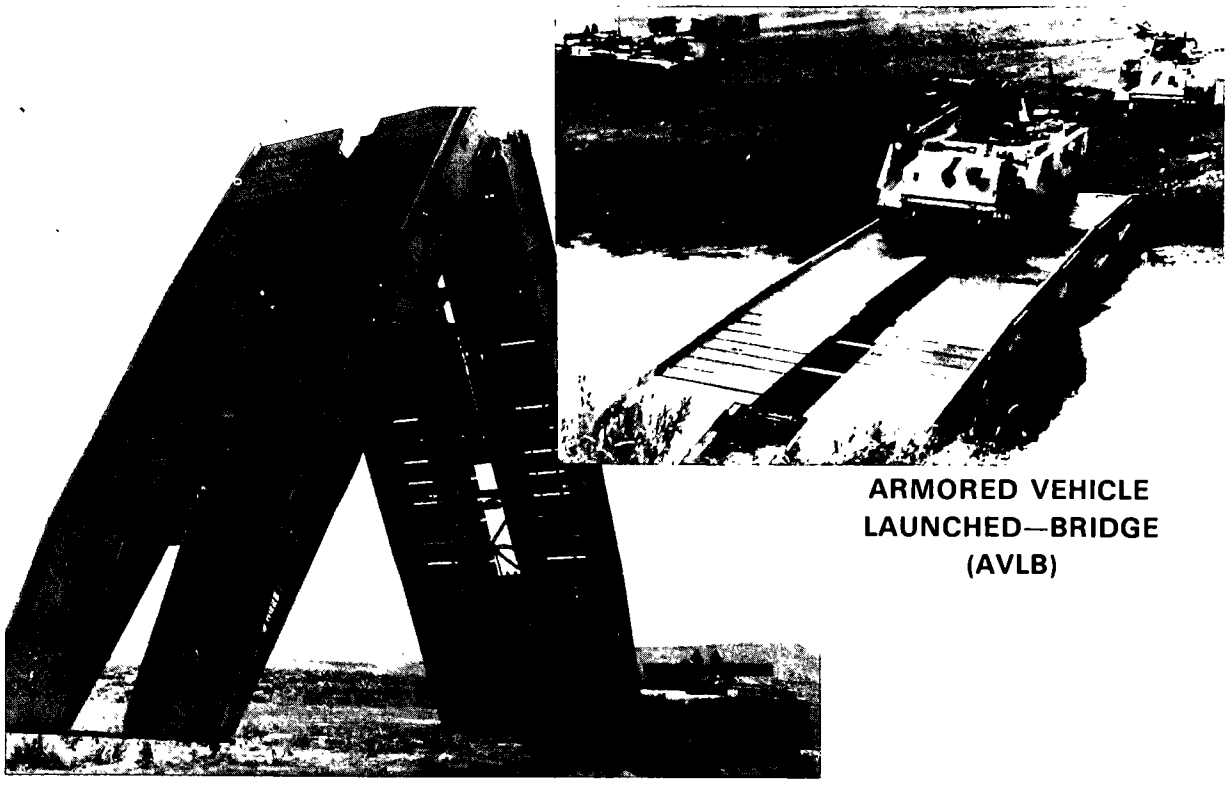


MOBILE ASSAULT BRIDGE (MAB)

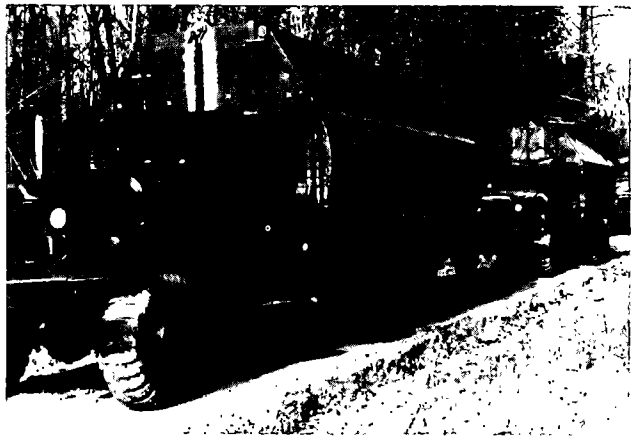
M4T6 FLOATING RAFT/BRIDGE



M4T6 FLOATING BRIDGE



ARMORED VEHICLE LAUNCHED—BRIDGE (AVLB)

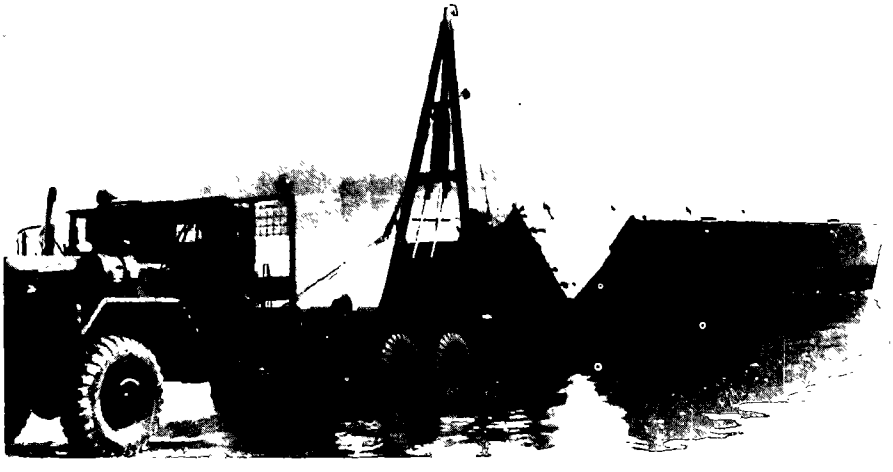


Moving

Launching

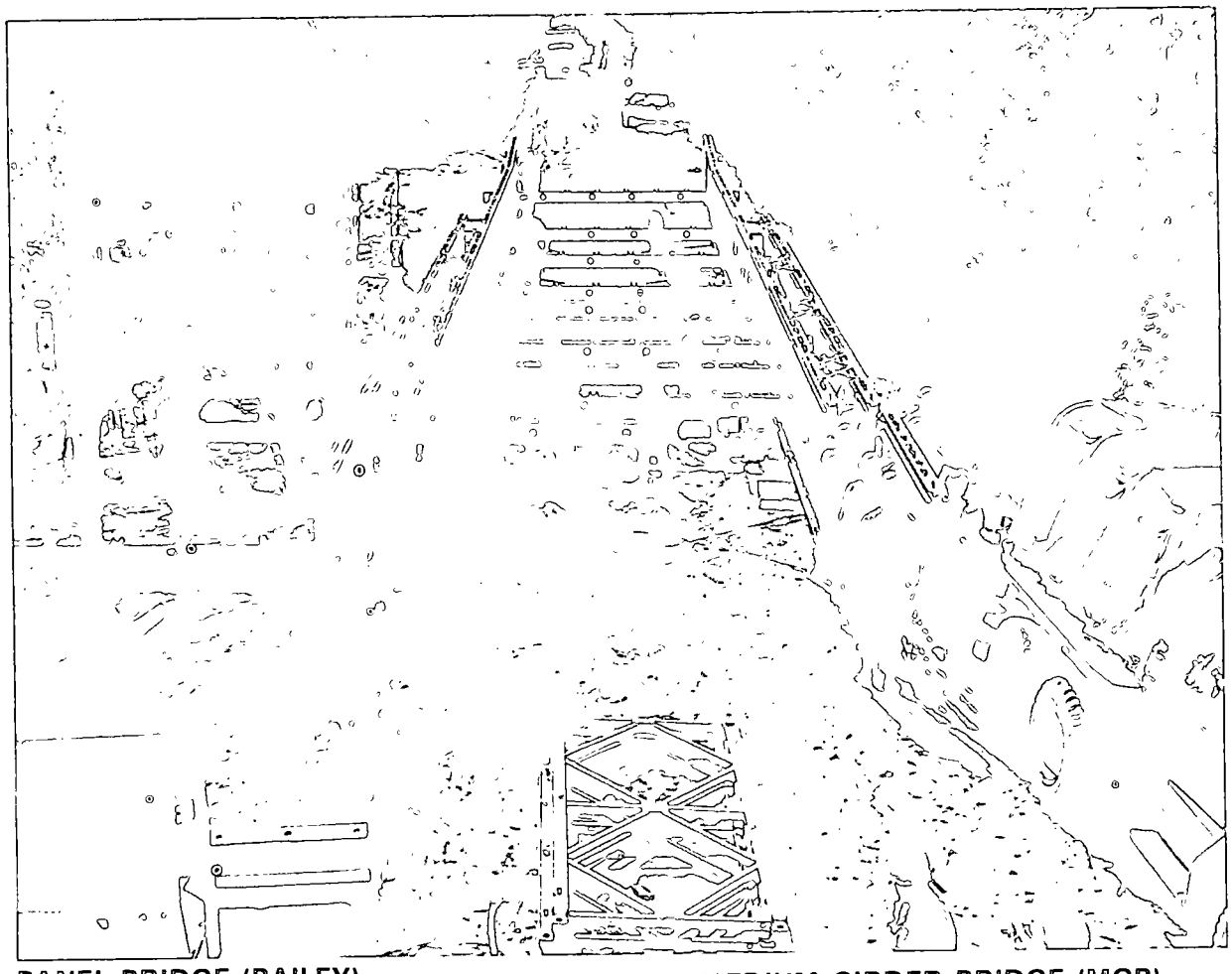
Unfolding

Retrieving



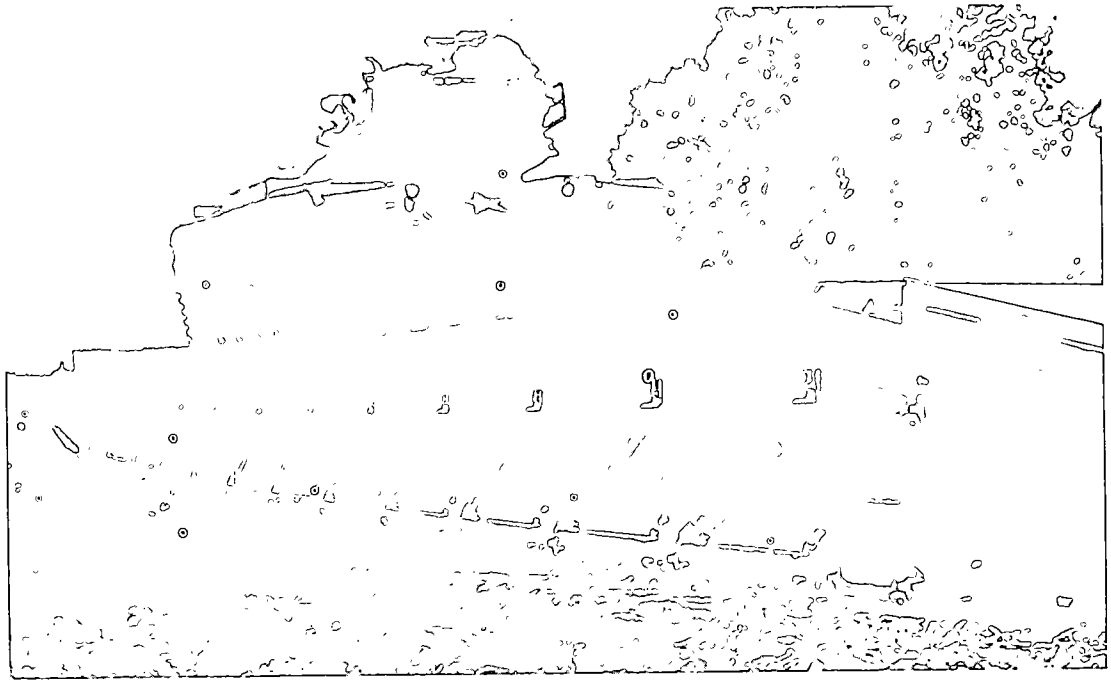
Open

RIBBON RAFT/BRIDGE



PANEL BRIDGE (BAILEY)

MEDIUM GIRDER BRIDGE (MGB)



B-10 Foldin

LEGEND FOR TABLE B—1

CL	—class	SP	—self-propelled	LBS	—pounds	%	—percent
BRG	—bridge	T	—ton	M	—meters	#	—number
HP	—horsepower	W/	—with	MPS	—meters per second		—greater than
HR	—hour	W/O	—without	MIN	—minutes		—less than
KMPH	—kilometer per hour	/	—per	OBM	—outboard motor	=	—equals

NOTES for TABLE B—1:

Proportionally increased detail of assembly, capability, and expedients is contained in FM 5—34, TM 5—210, and applicable equipment TM.

Crossing capacities are for normal leadings. See FM 5—34 and/or TM 5—210 for capacities of caution and risk crossings.

Assembly times estimated for daylight, trained troops, and good weather. For exceptions add:

- 50% for blackout conditions
- 30% for untrained troops
- 30% for bad weather e.g., rain, snow, or temperatures less than 4°C (36°F) or more than 30°C (86°F).

Assembly times exclude site preparation and anchorage installation.

Requirements for raft and bridge units (bays) and bridge erection boats do not include backup units or safety boats. Each site should have at least one safety boat.

Load space excludes ramp sections.

TABLE B—1 RIVER CROSSING EQUIPMENT

EQUIPMENT	CAPABILITIES	ALLOCATION	TRANSPORT/ SIZE	ASSEMBLY/ PROPULSION	LIMITATIONS	REMARKS
PNEUMATIC RECONNAISSANCE BOAT	3 men with equipment *OR* 600 lbs	3/Engr Co 10/M4T6 Brg Co	37 lb backpack w/3 paddles, pump, and repair kit 2.7x1.2x0.4m	5 minutes w/ pump Paddled at 1 MPS in 1.5 MPS Current	Control difficult in Currents 1.5 MPS	Four separate compartments Reduce Puncture Effect Calculate Drift
PNEUMATIC ASSAULT BOAT	15 men (3 engr) w/equipment *OR* 3375 lbs	18/Div Engr Bn 70/M4T6 Brg Co 9/Sep Bde Engr Co 80/Cellular Team	250 lbs 20 deflated boats per 2½ T truck 1 Inflated Boat/8 men 5.2x1.7x0.9m 3 pumps, 11 paddles	10 minutes w/pump Paddled at 1.5 MPS in 1.5 MPS Current *OR* 4.5 MPS with 25 HP OBM in 3.5 MPS current	1.5 MPS w/ paddles. Greater current may exceed control ability *and* return by engr crew. *OR* 3.5 MPS with OBM	Ten separate compartments reduce puncture effect Accelerate OBM gradually
ARMORED PERSONNEL CARRIER (M113)	12 men w/ equipment *OR* 3000 lbs	10/Engr Co of Heavy Div 20/INF (M) Co 2/ARMOR Co	SP 4.9m long 2.7m wide 2.2m high	10 min swim preparation Tracks only, 1.6 MPS	Entry bank-1m Exit bank-.5m 1.5 MPS current 1.5m Draft	Exit bank more critical than entry Slopes 20% desired
1¼ T CARGO TRUCK (M561) (GAMMA GOAT)	10 men w/ equipment or 2900 lbs	Organic to div units	SP 5.8m long 2.1m wide 2.3m high	15 min swim preparation Wheels only, 0.9 MPS	Entry bank-49% Exit bank-41% 1.8 MPS current 0.75m Draft	0.15m (6 in) waves 32 kmph headwind Slopes 20% desired
CARGO CARRIER (M548)	12,000 lbs	Organic to div units	SP 5.8m long 2.7m wide 2.7m high	10 min swim preparation Tracks only 1.6 MPS	Entry bank-1m Exit bank-.5m 1.5 MPS current 1.5m Draft	Exit bank more critical than entry Slopes 20% desired
SHERIDAN (M551)	4-man crew	Organic to Cav Sqdn Lt Armor Bn	SP 6.3m long 2.8m wide 2.9 high	5 min swim preparation 1.5 MPS	1.8 MPS current 0.20m (8 in) freeboard	Slopes 20% desired
BRIDGE ERECTION BOAT (27 FOOT)	9 men w/ equipment *OR* 3000 lbs	2/M4T6 Co 10/M4T6 Corps Company 3/MAB Co 14/RIBBON Co 8/M4T6 Div Engr Bn	2½ T w/ pole trailer *OR* 5 Ton bridge truck w/cradle 6800 lbs	30 min w/crane or wrecker *OR* 5 min from cradle 2-90 HP, 3500 lbs thrust Up to 11.3 MPS	1m draft	Primary use: —bridge erection —raft propulsion —safety

A safety matter that affects operational use is the load capacity of rafts, bridges, and equipment. The quantities shown in table B—1 are the "normal" capacities (i.e., the design capabilities). Certain safety factors or margins exist which, in *exceptional* circumstances, allow increased loadings. These capacities have been deliberately omitted because they are not intended for use in operational planning. The standard or design capabilities are provided for "normal" crossings. The exceptional category is intended for special situation using the terms "caution" or "risk" crossings.

In addition to the command decision required to employ "caution" and "risk" crossing loads, the physical status of the equipment must be considered. Damage by enemy action or age, nature of the crossing site conditions, and the type loads to be crossed are considered. Thus, the commander (crossing area or crossing force) obtains a professional judgment from the engineer. He weighs these factors with the tactical needs prior to directing increased loadings, keeping in mind that the equipment may be lost for future use.

- A *normal* crossing is defined as one in which the vehicle class number is equal to or less than the bridge classification number, where vehicles maintain 30-meter intervals on fixed or floating bridges, and where speed is restricted to 40 kph (25 mph). Sudden stopping or acceleration is forbidden.

- In a *caution* crossing, vehicles with a classification exceeding the capacity of the bridge by 25 percent are allowed to cross under strict traffic control. The caution class number of standard fixed or floating bridges may be obtained from FM 5—34, TM 5—210, or appropriated TMs. Caution crossings require that the vehicle remain on the centerline, maintain a 50-meter distance from other vehicles, not exceed 13 kph (8 mph), not stop, not accelerate, and not shift gears on the bridge.

- A *risk* crossing may be made only on standard prefabricated fixed and floating bridges. Risk crossings are made only in the greatest emergencies. The vehicle moves on the centerline, and is the only vehicle on the bridge; it does not exceed 5 kph (3 mph), does not stop, does not accelerate, and does not shift gears on the bridge. The vehicle class number must not exceed the published risk class for the type bridge being crossed. After the crossing, and before other traffic is permitted, the engineer officer reinspects the entire bridge for any damage.

Foldout

TABLE B—1 (continued) UMINUM FOOTBRIDGE

ALLOCATION/ TRANSPORTATION	CAPABILITIES	ASSEMBLY CREW/TIME			CAPACITY			LIMITATIONS/ REMARKS
		0-75m	76-160m	161-300m	Type	0-2.5mps	2.5-3.5mps	
1 set per cellular team (TOE 5—500) series) —144m footbridge —*or* 30m light veh brg —*or* 3 light veh rafts 1 set on two 2½ T trucks w/pole trailers 11000 lbs crated	*BRIDGE* —Foottroops —Walkway-.5m —# of bays = Gap(m)/3.4	1 plt 0.5 hr	1 plt 1 hr	2 plt 1 hr	Day Moon-light Black-out	75 men per min 40 men per min 25 men per min	60 men per min 30 men per min 20 men per min	NOTES: 1-6 2-pace interval between troops Anchorage req'd in currents 1 mps 10 x 15m site for assembly Draft OBM—0.6m Assembly crew in addition to brg personnel
		Daylight assembly time is 15 min site prep plus 1 min per 5m bridge						
	RAFT —¼ T truck w/trailer	1 plt—10 min			¼ T truck w/trailer, using two 25hp OBM in currents up to 3.5 mps			

LIGHT TACTICAL RAFT/BRIDGE

ALLOCATION/ TRANSPORTATION	CAPABILITIES	ASSEMBLY CREW/TIME		CAPACITY (CLASS)						LIMITATIONS/ REMARKS
		0-75m	176-160m	Vel	1.5	2	2.5	3	3.5mps	
When equipped w/ M4T6, 2 sets per div engr bn, 6 sets per corps float brg co. 6 Sets/Cellular Team 2 sets per ARM/ INF/INF(M) Engr Bn by MTOE 1 set is 4 pontoons & 4 deck bays 1 set on two 2½ T trucks & one pole trailer Each 3.35m bay weighs 2860 lbs	*BRIDGE* —1 set makes 13.4m CL16 brg in 1.5 mps current # of bays = Gap(m)/3.35 +2	1 plt 1.5 hr	2 plt 2.5 hr		16	13	11	5	2	NOTES: 1-6 10 x 15m site for assembly Draft —OBM—0.6m Roadway—2.9m Ramp articulators (2.1m) —Up 1m —Down 0.5m Assembly crew in addition to brg personnel
		Daylight assembly time is 15 min site prep plus 1 min per 1m bridge		200 veh per hr w/30m spacing and 16 kmph Anchorage or 27 ft brg boat req'd in vel 2mps						
	RAFT —1 set makes one raft of CL16 in 1.5 mps current —Raft powered w/25 hp OBM per pontoon *or* 27 ft brg erection boat	1 plt takes 20-30 min to build a 4 pontoon, 3 bay raft w/o articulators 10 m loading space			16	16	12	4	0	
				Class reduced by 4 w/articulators						

TABLE B—1 (continued) M4T6 FLOATING BRIDGE

<table>
<tr><th>ALLOCATION/
TRANSPORTATION</th><th>CAPABILITIES</th><th colspan="3">ASSEMBLY CREW/TIME</th><th>VEL</th><th>1.5</th><th>2</th><th>2.5</th><th>3.5(mps)</th><th>LIMITATIONS/
REMARKS</th></tr>
<tr><td rowspan="3">When equipped w/M4T6, 4 sets (171m) per div engr bn; 5 sets (213m) per corps float brg co.

1 set on twelve 5T brg trucks

1 normal bay (4.6m) disassembled per 5T brg truck

1 reinforced bay (3m) disassembled per 5T brg truck</td><td>RAFT: One set makes:
—One 4 float normal raft (4N) and one 5 float normal (5N) raft

—or one 4 float reinf raft (4R) and one 5 float reinf (5R) raft</td><td colspan="3">Per raft:
—5 brg trks
—2 power boats (27 ft)
—1 plt, 2¼ hrs
—When preassembled, 1¼ hr

Per raft
—6 brg trucks
—2 power boats (27 ft)
—1 plt, 3 hrs
—When preassembled, 1½ hr</td><td>4N
5N
4R
5R</td><td>50/55
55/60
50/55
60/65</td><td>45/50
50/55
50/55
60/65</td><td>40/45
45/50
45/50
55/60</td><td>30/35
35/40
35/40
45/50</td><td rowspan="3">NOTES: 1-6

When assembled at river, 40x40m area required.

Draft
—Raft/bridge—0.75m
—Bridge boat—1m

Roadway—4m

Assembly crew in addition to brg co personnel

Normal site prep and anchorage time concurrent w/assembly

Air compressor needed, crane recommended</td></tr>
<tr><td rowspan="2">BRIDGE: One set makes 43.2m

Normal construction, # of floats = Gap(m)/4.6 + 2+10%

Reinforced construction, # of floats = Gap(m)/3 + 10%</td><td>0-75m</td><td>76-160m</td><td>161-300m</td><td colspan="5">NORMAL BRIDGE</td></tr>
<tr><td>1 co
3 hr</td><td>2 co
6 hr</td><td>2 co-1 bn
10 hr</td><td></td><td>45/55</td><td>40/50</td><td>35/45</td><td>25/30</td></tr>
<tr><td></td><td colspan="3" rowspan="2">400 veh per hr w/30m spacing and 16 kmph</td><td colspan="5">REINFORCED BRIDGE</td></tr>
<tr><td></td><td></td><td>75/75</td><td>70/75</td><td>65/70</td><td>27/30</td></tr>
</table>

TABLE B—1 (continued) MOBILE ASSAULT BRIDGE (MAB)

<table>
<tr><th rowspan="2">ALLOCATION
TRANSPORTATION</th><th rowspan="2">CAPABILITIES</th><th colspan="3">ASSEMBLY</th><th colspan="3" rowspan="2">CAPACITY</th><th rowspan="2">LIMITATIONS/
REMARKS</th></tr>
<tr><th>0-75m</th><th>76-160m</th><th>161-300m</th></tr>
<tr><td rowspan="2">When equipped w/MAB, 144m per div engr bn
—16 interior bays
—8 end bays

212m per corps MAB co
—24 interior bays
—12 end bays

All units are SP

Movement size:
—12.8m (42 ft) long
—3.7m (12 ft) high
—3.7m (12 ft) wide
—12.2m turn radius
—Int bay—24T-CL21
—End bay—27T-CL23

Speed
—Highway—65 kmph
—Offroad—10 kmph</td><td>BRIDGE

Interior bays $= \frac{\text{Gap(m)}-20}{8}$

Anchorage by prop and/or fluke anchor</td><td>2/3 hr</td><td>1 hr</td><td>2 hr</td><td colspan="3">200 veh per hr w/30m spacing and 16 kmph
—CL 62 in currents < 2mps
—CL 55 in currents > 2 < 3mps
Curents > 4 mps may require additional anchorage</td><td rowspan="2">NOTES: 1-6

Reduce capacity by 30% in currents > 3.5 mps

Assembled by crew

No assembly site</td></tr>
<tr><td colspan="3">Average rate is 150m of brg per hr</td></tr>
<tr><td rowspan="7">RAFTS

2 units (end bays) CL 25

3 units, CL 40

4 units, CL 60

5 units, CL 60+

6 units, CL 60+</td><td colspan="3">TIME</td><td>Class</td><td>Short Tons</td><td>Load Space</td><td rowspan="7">Loaded MAB draft
—w/power 1.5m
—w/o power 1m

Roadway—3.7m

Six-unit raft
—2 veh > CL 12
—or 4 veh < CL12

Other rafts
—1 veh > CL 12
—or 2 veh < CL 12

Raft load limited to tonnage. Ramp limited to veh class</td></tr>
<tr><td colspan="3">6 min</td><td>36</td><td>36</td><td>8.5m</td></tr>
<tr><td colspan="3">8 min</td><td>47</td><td>54</td><td>16.5m</td></tr>
<tr><td colspan="3">10 min</td><td>60</td><td>72</td><td>24.5m</td></tr>
<tr><td colspan="3">12 min</td><td>60+</td><td>90</td><td>32.3m</td></tr>
<tr><td colspan="3">14 min</td><td>60+</td><td>108</td><td>40.3m</td></tr>
</table>

TABLE B—1 (continued) RIBBON BRIDGE

ALLOCATION/ TRANSPORTATION	CAPABILITIES	ASSEMBLY TIME			CAPACITY						LIMITATIONS/ REMARKS
		0-75m	76-160m	161-300m							
When equipped w/ RIBBON, 144m per div engr bn —20 interior bays —8 end bays 213m per corps RIBBON co. —30 interior bays —12 end bays Each bay transported on 5T truck (modified) Bridge erection boats (27 ft) —10 @ div brg co —14 @ corp brg co —Transported on 5T brg truck w/ cradle	*BRIDGE* # Interior bays = $\frac{\text{Gap(m)-14}}{6.7}$ Anchorage w/1 brg boat per 3 bays in vel < 3mps	0.5 hr	1 hr	2 hr	200 veh per hr w/ 30m spacing and 16 kmph —CL60 in currents < 2.5mps —CL45 in currents > 2.5 < 3mps Currents > 3rnps may require additional anchorage						NOTES: 1-6 Assembled by crew Ramp speed is 10 kmph for veh > CL 40 Bay launch points —Multiple — <10% slope —0.75m water depth Loaded RIBBON draft —Bay—0.6m —Brg boat—1m Roadway—4.1m Adding pallet to offloaded brg truck gives cargo MSN.
		Average rate is 150m of brg per hr									
	RAFTS —3 Bay —4 Bay —5 Bay	Average rate is 5 min per bay (6.7m) 15 min 20 min 25 min			*Velocity (MPS)*					LOAD SPACE(m)	
					1.5		2.5	2.7	3		
					45	40	35	30	25	13	
					60	60	60	55	20	20	
					75	70	70	60	50	27	

ARMORED VEHICLE LAUNCHED BRIDGE (AVLB)

ALLOCATION	TRANSPORTATION	EMPLACEMENT	CAPACITY (CLASS)	LIMITATIONS/ REMARKS
Engr Bn of Arm/Inf/ Inf (M) Div: —4 launchers —6 bridges Engr Co of Arm/ Inf (M) Sep Bde: —2 launchers —3 bridges Armor Bn —2 launchers —2 bridges	Bridge carried on launcher (modified M48A2 or M60A1 chasis) Spare bridge folded on low bed trailer (25T) w/10T tractor Bridge weighs 15T 20T crane transfers to launcher in 20-30min	Launched in 2—5 min by buttoned-up 2-man crew Retrieved from either end. One man exposed to guide and connect Veh turning in soft earth w/in 5m of brg ends limits retrieval	CL 60 vehicle AVLB (19.2m-63ft) spans: —18.3m (60ft) using prepared abutments —*or* 17.4m (57ft) using natural earth	M48A2 requires gas while M60A1 is diesel Scissors launch requires 10m overhead clearance Max launch slope —28% uphill —19% downhill —11% sideslope AVLB fords 1.2m (4 ft)

TABLE B—1 (continued) PANEL BRIDGE (BAILEY)

ALLOCATION/ TRANSPORTATION	CAPABILITIES	ASSEMBLY/CAPACITY				LIMITATIONS/ REMARKS
		Length	Crew	Time	Class	
1 set per corps panel brg co 1 set on 29 5T dump trucks Reinforcements set increases capacity of standard bridge	Erected in 3m (10ft) increments Numerous erection combinations Per set: —Two 24.4m —*or* one 58.5m	Normal Construction				Notes 3 & 4 20 x 30m assembly site required Assembly crew in addition to brg co personnel See FM 5-34 or TM 5-277 for more capacities and uses
		-24.4m	1plt	2hr	$\frac{50}{55}$	
		w/cable reinforcement				
		-54.8m	2plt	6hr	$\frac{50}{60}$	
		3.8m roadway				

MEDIUM GIRDER BRIDGE (MGB)

ALLOCATION/ TRANSPORTATION	CAPABILITIES	ASSEMBLY/CAPACITY				LIMITATIONS/ REMARKS
		Length	Crew	Time	Class	
4 bridge sets per corps engineer MGB co Reinforcement set increases capacity of standard bridge	1.83m (6 ft) increments Numerous erection combinations Four 30.5m (100 ft) bridges or Two 48.8m (160 ft) bridges	Normal construction				Notes 3 & 4. 25 x 20m assembly site required. Only MGB co personnel required for assembly/disassembly. See draft TM 5-5420-212-12 1977 for more details. *4 hr assembly time only approximate. Additional trials required.
		30.5m	1plt	1hr	60	
		w/cable reinforcement				
		48.8m	1plt	4hr*	60	
		4m (13.2 ft) roadway				

TABLE B—2 BOAT/RAFT PLANNING FACTORS*

EQUIPMENT	CHARACTERISTIC	RIVER WIDTH (1.5 MPS VEL)		
		75m	150m	300m
Pneumatic assault boat —w/OBM	Minutes per round trip	3	4	5
	Trips per hr	15	10	6
—w/o OBM	Minutes per round trip	4	6	10
	Trips per hr	20	15	12
RAFTS: LTR M4T6 MAB RIBBON	Minutes per round trip	7	10	15
	Trips per hr	8	6	4
	Rafts at each site	1	2	3

*Factors are average based on load/unload time and safety.
**Planning times are for stream velocities up to 1.5 mps—for faster stream velocities, classification must be reduced to caution or risk crossings and an engineer analysis must be made of actual site conditions before planning times may be assessed.

TABLE B—3 HELICOPTER CAPABILITIES (EXTERNAL LOADS)

Helicopters provide a significant capability to river or gap crossings by transporting either personnel or equipment. External load planning capabilities are as follows:

HELICOPTER	APPROXIMATE OPERATIONAL LOAD (POUNDS)	APPROXIMATE MAXIMUM LOAD (POUNDS)
CH—47C	19,000	20,000 (Hook Limitations)
CH—54B	20,000	25,000

NOTE:

1. Operational load is the maximum external load with full fuel, standard day, and at sea level (FM 101—20).
2. Maximum external load is based on minimum fuel and structural capacity of the helicopter (FM 101—20).
3. Planners **MUST** coordinate with appropriate aviation advisors for actual loadings for specific conditions.

TABLE B—4 TYPICAL EXTERNAL LOADS

Bridging equipment may be delivered by helicopter to bridge assembly worksites. Small rivers or gaps may be spanned by components of the M4T6 float bridge, called M4T6 fixed spans. The following table provides an indication of type loads and weights of selected river crossing means. Consult TM 55—450—11, Helicopter External Loads, for additional loadings and loading preparations.

EQUIPMENT	WEIGHT (POUNDS)	REMARKS
M4T6 Fixed Spans ● 23'4" CL 100 ● 30'0" CL 65 ● 38'4" CL 35 ● 45' CL 25	 12,900 15,600 18,800 20,900	Components assembled in 8'4" and 15'0" increments. May be transported in packages to reduce load. Load class may be increased by varying deck size.
LIGHT TACTICAL RAFT (LTR) ● Ponton load ● Deck Load	 6,000 10,500	Separate loads delivered to assembly site for final assembly. Combination load placed on water surface.
PNEUMATIC ASSAULT BOAT	250	Transported in bundle or inflated mode
BRIDGE ERECTION BOAT (27 ft)	6,800	Also lifted in bow and stern configuration
M4T6 FLOAT BRIDGE COMPONENTS ● Float w/o deck ● Float w/deck ● Two floats w/ partial deck	 6,700 11,700 16,900	Additional loadings contained in TM 55—450—11. Loads placed on water or shore for further assembly
RIBBON BRIDGE BAYS • Interior Bay • End Bay	 11,870 12,050	Placed directly on water surface

CONTENTS

Physical Characteristics	C—2
Site Analysis	C—5
Field Calculations	C—6

APPENDIX C

crossing site characteristics

This appendix supplements the general descriptions of acceptable crossing sites in chapters 2 and 3.

Selection of crossing sites is primarily based on the:

- Existing situation and/or anticipated scheme of maneuver.
- Physical characteristics of the available sites, road networks, and surrounding terrain.
- Availability and capabilities of crossing means.
- Availability of engineer support.

Conflicts between tactical and technical requirements frequently occur. Commanders evaluate the factors bearing on the problem to determine the best overall solution.

PHYSICAL CHARACTERISTICS

Possible sources of information include:

- Maps
- Local inhabitants
- Aerial photographs
- Aerial visual reconnaissance
- Prisoners
- Strategic studies
- Hydrographic studies
- Ground reconnaissance

The desirable physical characteristics of crossing sites depend on the:

- Method of crossing
- Specific crossing means
- Type vehicles to be crossed

Planners need information of potential crossing sites to evaluate their compatability with proposed crossing plans.

Generally planners need to know:

- Friendly and enemy capabilities and probable courses of action.
- Site capacity for crossing of troops, equipment, and supplies using various crossing means.
- Engineer support required to develop, improve, and/or maintain each site.

More specifically planners need to know the:

- Bank, bottom, and water conditions of the river.
- Impact of forecast or historical seasonal weather conditions.
- Defensible terrain, cover and concealment, and natural or enemy-emplaced obstacles on both sides of the river.
- Time and effort required to develop sites, assemble rafts, and construct bridges.
- Entry/exit routes and off-road trafficability.
- Road networks.
- Capability to deny observation, suppress fires, and provide site protection.

General characteristics and requirements for type sites are contained in table C—1.

TABLE C—1

<table>
<tr><th></th><th>FORDING</th><th>ASSAULT/SWIMMING</th><th>RAFTING</th><th>BRIDGING</th></tr>
<tr><td>ENTRY/EXIT</td><td colspan="4">A desired feature of all sites is readily accessible entry/exit routes or paths on either bank. Approaches to banks are checked for their ability to support the requirements of the crossing element e.g., width, slope and trafficability for wheeled and tracked vehicles. Covered and concealed approaches enhance surprise and survivability; however, multiple routes, free from obstructions, will increase crossing speed and flexibility. Exit bank conditions often take precedence over entry bank until equipment and personnel can be crossed to develop and improve the exit site.</td></tr>
<tr><td rowspan="2">ROUTES & APPROACHES</td><td>Dismounted forces may use approaches with steep slopes and heavy vegetation, while vehicle fording requires paths or roads to approach fording sites.</td><td>Assault boat crossings may utilize more rugged approaches than amphibious vehicles.</td><td>Multiple approach routes to rafting sites are favored to permit relocation of rafting up or downstream.</td><td>Bridge sites require developed road networks to sustain the crossing capacity.</td></tr>
<tr><td colspan="4">In general, wheeled vehicles require 3.5 meter wide paths with 3.5 meters of overhead clearance. Dry, hard slopes of 33% can be negotiated, however, slopes less than 25% are desired. Tracked vehicles require up to 4 meter path widths and 3.5 meters overhead clearance. Tanks can climb 60% (31 degree) slopes on dry, hard surfaces. Slopes less than 50% are desired.</td></tr>
<tr><td>AREAS</td><td colspan="4">Numerous areas are required for equipment and personnel preparing and protecting sites, and for personnel and vehicles preparing and/or waiting for crossing. These areas should be dispersed, provide cover and concealment, yet be accessible to road networks near the sites.</td></tr>
</table>

TABLE C-1 (Continued)

	FORDING	ASSAULT/SWIMMING	RAFTING	BRIDGING
RIVER CONDITIONS	In general, currents less than 1.5 meters per second are desired. Narrow segments of the river decrease equipment requirements, crossing time, and exposure.		However, resulting increased current velocities may offset any advantage.	
BANKS	May be steep and rugged for dismounted troops. Vehicles require slopes 33% and firm soil conditions. Exiting vehicles require banks that remain firm after extended usage.	May be steep when using assault boats for dismounted troops. Amphibious vehicles may be able to enter over low (1m) vertical banks but require sloped exists.	Vertical banks of approximately 1 to 2 meters may be accommodated by bridge/raft ramps. EQUIPMENT — RAMP ARTICULATION (*Up* / *Down*) LTR — 1m / 0.5m M4T6 — 0 / 0 MAB — 2m / 2m RIBBON — 0.75m / 0.75m	
DEPTH	Personnel 1m Wheeled Vehicles .75m Tracked Vehicles 1.2m	Sufficient depth for operation of boats or vehicles to be used. Pneumatic Assault Boat w/outboard motor APC M113—1.5 m M548—2m	Need deep water close to bank to preclude grounding of raft/bridge when loaded. EQUIPMENT — DRAFT Power Boat (27 Ft) 1m LTR 0.6m* M4T6 0.75m* MAB (w/power) 1.5m MAB (w/o power) 1.1m RIBBON 0.6m* **power boat draft may govern.*	
BOTTOM	Free from obstacles, firm and uniform. Riverbeds may be improved with rock fill or grading equipment. Guide stakes facilitate crossing.	Free from obstructions which interfere with boats or tracks of amphibious vehicles.	Free from obstructions which could interfere with boat operations.	Bridges emplaced for lengthy periods (4 hours or more), or in strong currents require anchorage. Need suitable riverbed for anchorage.
ENEMY SITUATION	Sites masked from enemy observation enhance surprise and survivability. The use of existing sites reduces preparation time but requires caution in that the enemy may have emplaced obstacles and registered artillery on the site.			

SITE ANALYSIS

A ground reconnaissance is conducted to refine and confirm information gathered from other sources. (FM 5—36 and TM 5—210 contain details for the conduct and reporting of site reconnaissance.) From these and other detailed reports, planners may develop charts to compare alternative sites. Unit SOPs may prescribe specific comparative methods; an example follows:

CROSSING SITE COMPARISON

Entry/Exit

- **Describe foot, wheeled, and tracked (heavy and light) movement capability on roads, trails, and cross-country.**
- **Include day, night or other reduced visibility constraints.**
- **List space suitable for work sites and assembly areas and available cover/concealment.**

River Conditions

- **Specify width, depth, velocity, and bottom conditions as appropriate.**
- **Include variations or unique factors (e.g., a sandbar, turbulence, and depth at bank).**
- **Describe bank height, slope, and stability.**

Obstacles and enemy situation.

- **List significant natural and enemy emplaced obstacles.**
- **Include enemy positions and capability to observe or interfere at the site (e.g., known artillery registrations).**

Remarks

- **Include overall assessment of crossing site potential.**

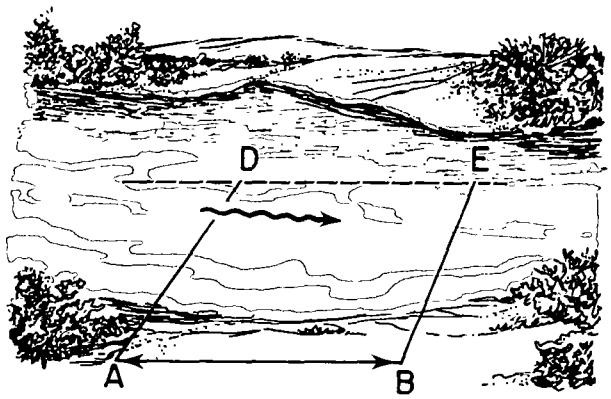
FIELD CALCULATIONS

Some common relationships and expedients useful during a ground reconnaissance follow:

Unit measures of speed. Perhaps it is helpful to correlate the *desired* maximum stream velocity of 1.5 meters per second (mps) with a familiar comparative unit of measure. The "quick time" march rate of 120 counts, or 30 inch steps per minute, equates to 1.52 mps. Other *approximate* correlations of 1.5 mps include:

- 5 feet per second (fps)
- 3.5 miles per hour (mph)
- 5.5 kilometers per hour (kmph)

Measuring river velocity. The current of the river is critical to effective and safe operation. It can be reasonably estimated by measuring a distance along the river bank and noting the time a floating object takes to travel the same distance. Dividing the distance by the time provides the water's speed. For example:

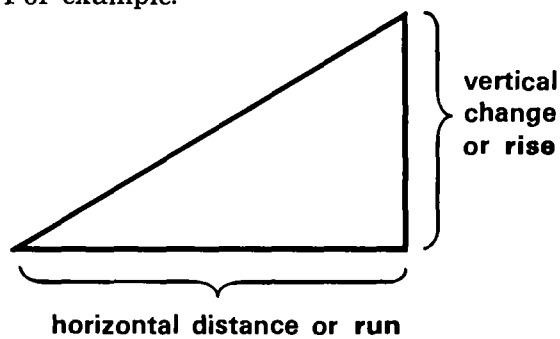


- **Measure AB.**
- **Throw floating object (e.g., a stick) upstream of the start point.**
- **Record time for object to float from D to E.**

$$\text{Current} = \frac{\text{Distance AB (meters)}}{\text{Time DE (seconds)}}$$

Slopes and degrees. The slope of terrain is of significance (e.g., slopes of 7 percent (%) or more slow movement and may require vehicles to operate in a lower gear). Slope, usually expressed as a percentage (%), is the amount of change in elevation (rise or fall) over a ground (horizontal) distance.

For example:



Rise divided by the *run* multiplied by *100* equals the percent of slope (% slope = rise/run × 100). The rise and run are expressed in the same unit of measure (e.g., feet or meters).

Vehicle capabilities to climb or descend terrain are commonly expressed in percent of slope (e.g., tanks can negotiate slopes of 60%). This is based on ideal conditions (e.g., a dry, hard surface). Rocks, stumps, loose soil degrade capabilities. Wheeled vehicles generally are limited to a maximum slope of 33%.

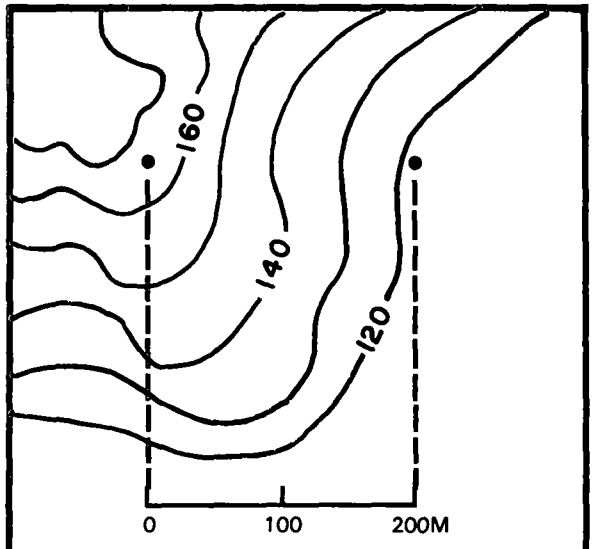
Means to determine percent of slope include:

Clinometer: An instrument, organic to most engineer units, that measures percent of slope.

Map: Measure the horizontal distance along the desired path. Determine the difference in elevation between the start and end points of the path. Insure both figures are the same unit

of measure (feet, meters, etc.), then divide the elevation (rise) by the distance (run), and multiply by 100 to get percent of slope.

For example,



Rise = 165-120 = 45 meters

Run = 200 meters

$$\text{\% slope} = \frac{45}{200} \times 100 = 22.5\%$$

Line of sight and pace: This method uses:

- Eye level height above ground (usually from 1.5 to 1.75 meters)

and

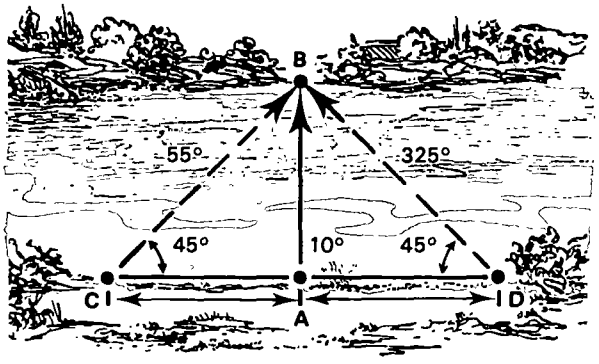
- Length of standard pace (usually 0.75 meters)

While standing at the bottom of the slope, the individual picks a spot on the slope while keeping his eyes level. The distance is paced. The procedure is repeated at each "spot." The vertical and horizontal distances are added separately to provide the total "rise" and "run."

Slope may also be expressed in degrees; however, this is an angular measure and is *not* commonly used because the relationships are more complex than desired for field use. Some relationships of percent and degree of slope are as follows:

SLOPE	DEGREES
100%	45°
60%	31°
40%	22°
20%	11°

Measuring river width. A field expedient means of measuring river width is with a compass. While standing at the waterline, sight on a point on the opposite side. Note the magnetic azimuth. Move up or down stream until the azimuth to the point on the opposite bank is 45 degrees different than the original reading. The distance from the original to the final point of observation is equal to the stream width. For example:



Original observation from A to B reveals 10° azimuth.

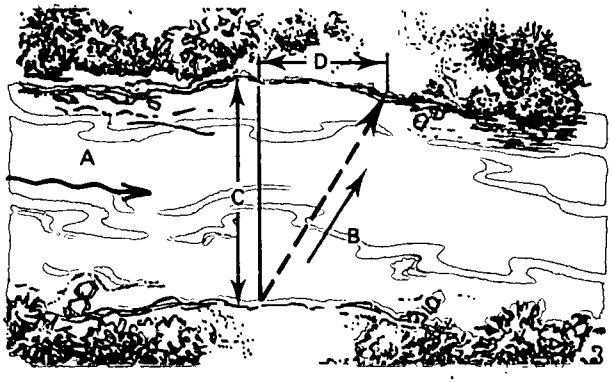
Move toward either C or D, when azimuth is 45 degrees different, the distance AC or AD equals AB (the river width).

Calculating downstream drift. The river current causes all surface craft to drift downstream. Amphibious vehicles and assault boats drift more than powered boats and rafts; the latter have a greater capability to negate the effect of river velocity by applying more power.

Amphibious vehicles and man-powered assault boats are generally limited to water speeds of 1.5 to 2 meters per second (mps) and 1 mps respectively.

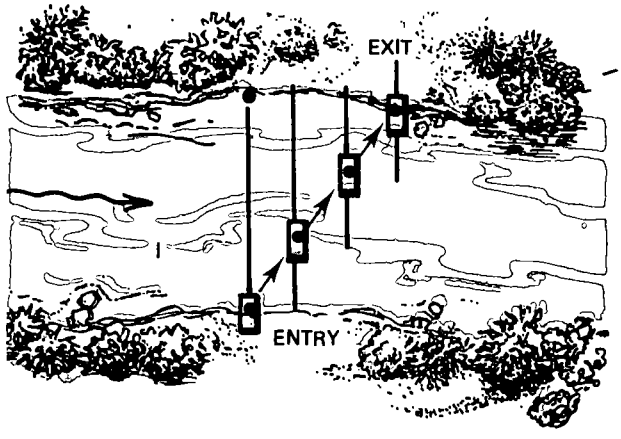
The amount of downstream drift may be estimated as follows:

$$\frac{\text{River speed (A)}}{\text{Crossing speed (B)}} \times \text{River Width (C)} = \text{Downstream Drift (D)}$$



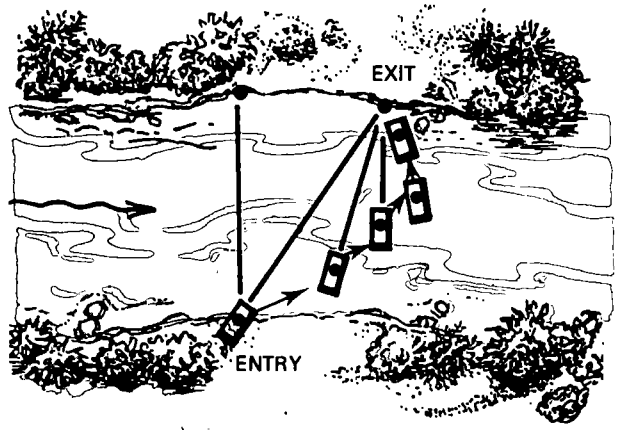
All measurements must be in the same unit of measure (e.g. meters, feet, etc.).

Crossings with amphibious vehicles and pneumatic boats must compensate for the effect of river current. For example, entry is usually made upstream of the desired exit point. The vehicle or boat is aligned, or "aimed" straight across the river; however, the current produces a "sideslip" downstream forward movement as shown.

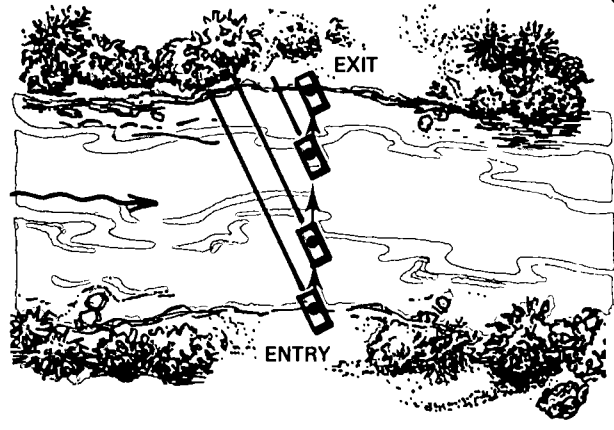


This technique requires operator training in continual adjustment of the "aim" point on the exit bank.

Alternatively, if the operator continues to "aim" the vehicle at the desired exit point, the orientation of the craft at the exit point would approximate an upstream heading as shown below. The path of the craft would be an arc in proportion to the river's speed.

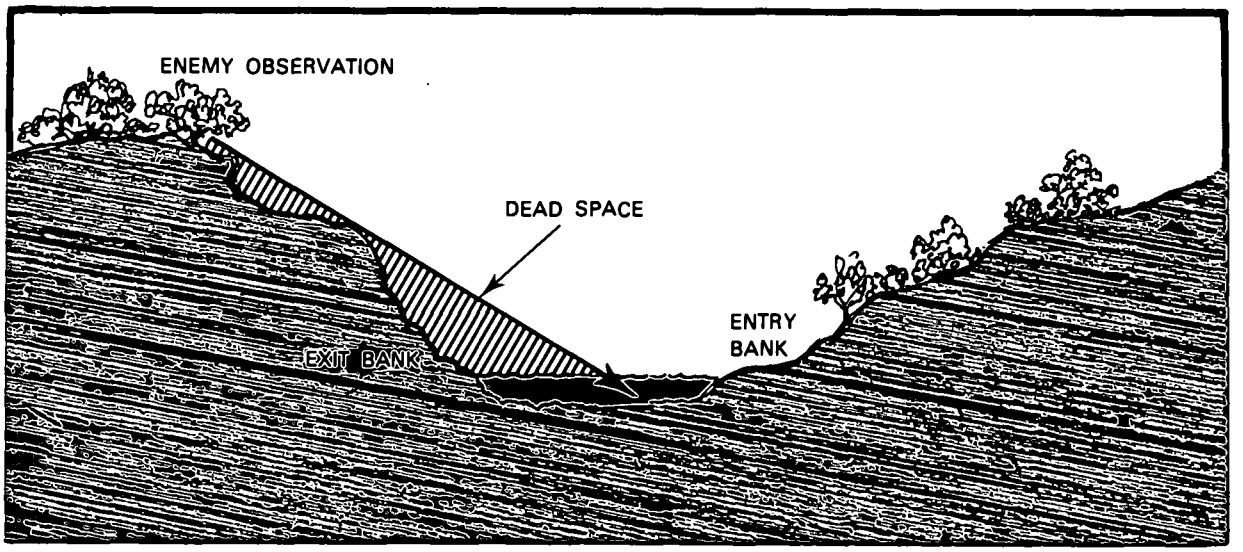


To exit at a point directly across from the entry point requires an upstream heading to compensate for the river's speed.



In all three examples, the craft's speed relative to the river's speed is constant, assuming the engine RPMs or paddling rate remains constant. The elapsed crossing time is the least in the first example (i.e., when the vehicles head-on orientation is perpendicular to the exit bank). This technique results in a uniform crossing rate in the least amount of time and is usually the desired technique.

Terrain conditions may restrict the location of entry/exit locations. Enemy situations may require alternative techniques. For example, when "aiming" at the downstream exit point (example 2), the craft moves at a greater speed *relative to the banks* after entry than it does as it nears the exit. The cause is the river current speed. Use of this technique may be favored when the enemy has better observation of the entry bank than the exit bank as illustrated. Water craft moving fast and at a changing rate are more difficult to engage effectively.



CONTENTS

Planning Sequence D—2
River Crossing Planning Schematic D—5

APPENDIX D

offensive planning considerations

This appendix provides, in a simplified format, planning factors to assist river crossing planners at all levels. Planning by staffs of units conducting independent operations *or* subordinate units implementing higher level plans may have reduced planning requirements, and the detail may vary. However, all planning factors are considered.

Divisions, brigades, and battalions conducting independent crossing operations normally require augmentation with combat support and combat service support units.

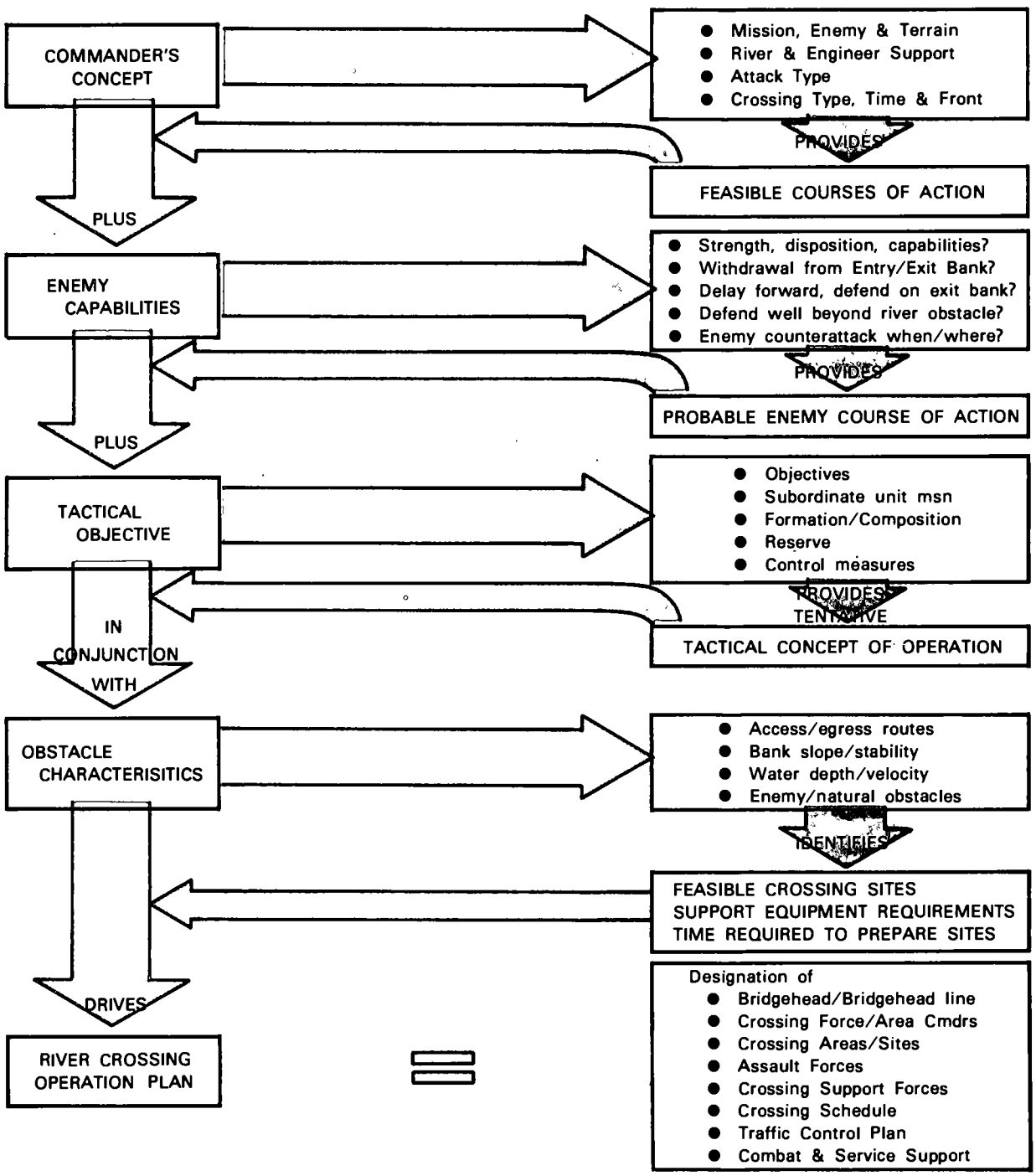
PLANNING SEQUENCE AND CONSIDERATIONS	
Commander's Concept of the Operation	
MISSION STATEMENT	Commander formulates mission from corps guidance and orders.
ATTACK TYPE	Based on present tactical situation, enemy, and terrain, commander states desire for either a hasty or deliberate attack.
CROSSING TYPE	To support attack, also considering the river to be crossed and engineer support available, commander suggests either a hasty or deliberate crossing be planned.
TIME	Time of crossing, either night or day, is also suggested.
FRONT	The width of the crossing front (broad or narrow) desired by the commander should also be stated.
Preliminary Considerations	
ALERT	Early notification of subordinate units.
INTELLIGENCE	Enemy situation/capability and obstacle characteristics.
Securing the Bridgehead	
BRIDGEHEAD	Analyze objective area and select bridgehead size to accommodate the crossing.
OBJECTIVES	Evaluate key terrain, observation and defensibility.
FORCES	Determine forces required to secure the bridgehead/objective(s).
TIME	Estimate time necessary to secure the bridgehead/objective(s).
RESOURCES	Consider use and allocation of: ● Assault forces ● Airborne forces ● Air assault forces ● Friendly partisans ● Engineers ● Fire Support ● Air Defense

	● Military Police ● Communications ● Intelligence ● Combat Service Support ● Electronic Warfare ● Smoke ● Deception
Advance from the Exit Bank	
MANEUVER	Develop exit bank maneuver concept—approach avenues/attack zones/assault forces/follow-up forces and support.
MISSIONS	Determine and assign missions to subordinate units including supporting assets.
INTERMEDIATE OBJECTIVES	Assign as required to subordinate units. Develop and depict measures necessary for control of the advance.
CONTROL MEASURES	
Assault Crossing of the River	
CROSSING FRONT/AREAS/SITES	Designate crossing front for the force as a whole. Divisions determine crossing areas for brigades. Bdes/Bns select crossing sites if possible. Designate crossing commanders.
CROSSING METHOD/MEANS	Determine best method, means, and sites (tactically and/or technically) to be used.
CROSSING SUPPORT	Develop engineer, military police, and site security requirements.
OPERATIONAL TIMES	Estimate/designate operational times for sites, rafts, and bridges.
CROSSING PLAN	Develop sequence and schedule of crossing units.
MOVEMENT PLAN	Establish routes, traffic control posts, holding areas, engineer regulating points, and release points/lines.
COMMUNICATION PLAN	Develop communication plan to control traffic in crossing area. Consider non-electrical means.
AIRSPACE COORDINATION	Plan control measures for tactical air, army aviation, artillery, and air defense in the crossing area.

COMBAT AND COMBAT SERVICE SUPPORT	Allocate necessary support for the crossing operation.
TRAINING	Determine and conduct specialized training required for the assault.
ENEMY	Evaluate vulnerability to enemy attack and interruption of the assault.
Advance to the River	
CONTROL MEASURES	Crossing areas, control headquarters, routes, staging areas, holding areas, traffic control posts, engineer regulating points, and other control measures are designated before advance is initiated.
COMMAND AND CONTROL	Turnover of responsibility from the assault force commanders to the crossing area commanders is designated or by mutual agreement between commanders.
FORCES	Align/position forces as required.
General	
CONTINUOUS PLANNING	Reevaluate and adjust overall requirements.
SUPPORT	Determine, request, and allocate necessary support for the operation.
TENTATIVE PLANS	Prepare and disseminate tentative plans to higher and subordinate units. Review and approve subordinate plans.

RIVER CROSSING PLANNING SCHEMATIC

The following schematic of the planning process illustrates the primary considerations in a river crossing without reference to the planning segments (e.g., secure the bridgehead, advance from the exit bank, etc.) as portrayed in the preceding section.



APPENDIX E

offensive crossing scenario

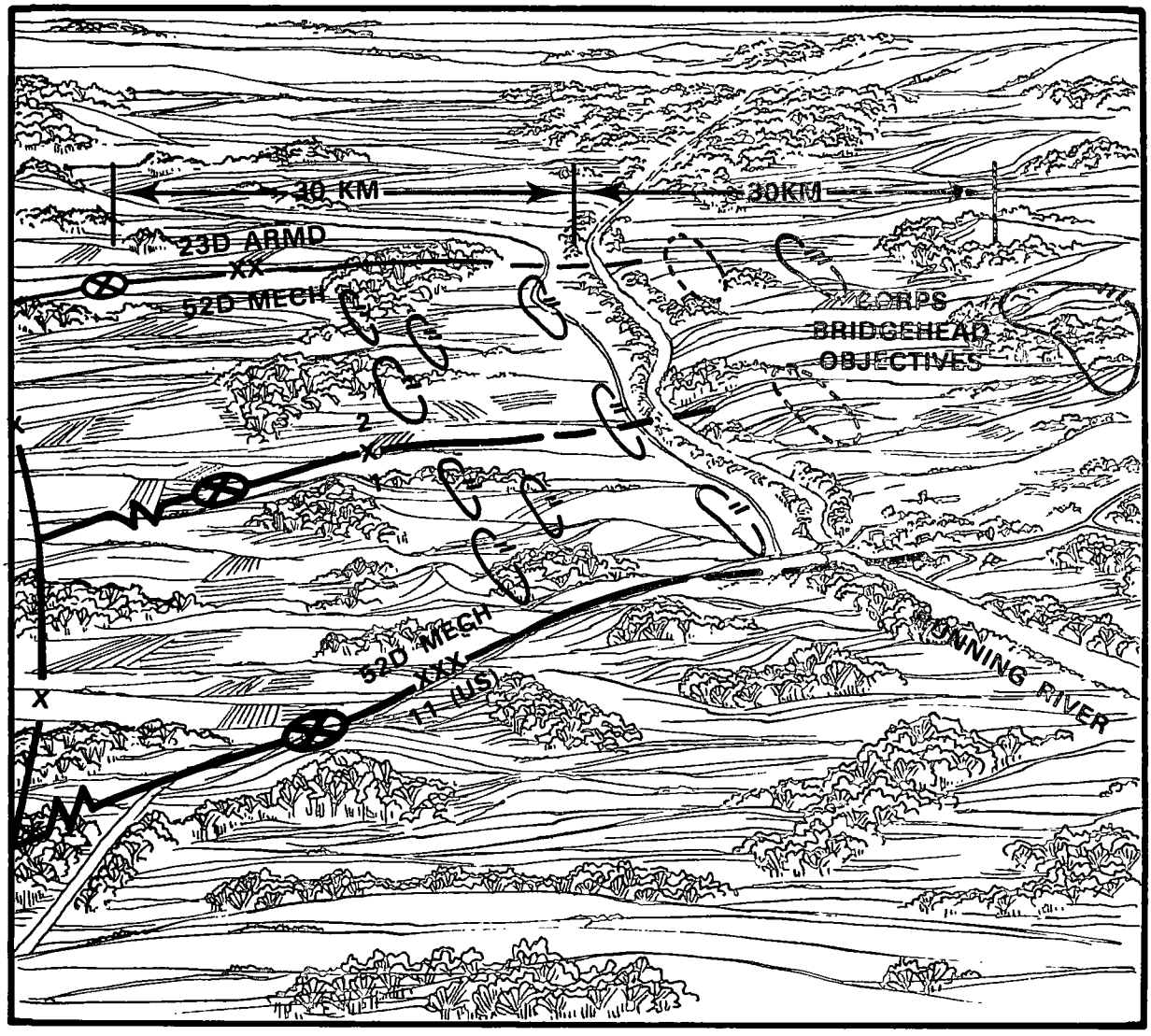
This appendix provides a general scenario for offensive crossings. It *limits* the discussion of routine tactical planning and *concentrates* on the technical aspects related to the assault crossing of the river and command and control. It is hypothetical, one means of many, and is intended to assist planners at division, brigade, and battalion levels.

GENERAL SITUATION

It is now 19 July. On 4 July enemy forces crossed the international border and attacked the allied nations. The main attack was in the US sector, and was met by the 10th (US) Corps. Employing an active defense against the numerically superior enemy, allied forces slowed the advancing enemy and stabilized the front on 18 July.

The 10th (US) Corps was forced to conduct a retrograde river crossing over the Running River. The corps is currently deployed on a defensive sector 30 kilometers west of the Running River, with the 23d Arm Div in the north and the 52d Mech Div in the south.

Allied forces are preparing to launch an offensive on 22 July to regain the international border. The commander, 10th (US) Corps, has determined that offensive operations in his sector will require a crossing of the Running River. He has issued a warning order to the 52d Mech Div to develop a crossing plan to secure a bridgehead for further offensive operations (see sketch below).



The CG, 52d Mech Div, realizes that the crossing operation is contingent upon the success of the division's deliberate attack from current defensive positions. Upon penetration of the enemy's main defenses, the advance to the river could be very rapid. Taking advantage of a disorganized enemy, the CG contemplates a hasty crossing.

To accomplish his concept, the CG designates his ADC for maneuver as the crossing force commander to plan and control the assault crossing. To assist in the planning and control, corps has already made available elements of the supporting engineer brigade, his staff, and COSCOM. The CG now directs his staff, including the newly appointed crossing force engineer, to prepare plans for a hasty crossing to secure the corps-directed bridgehead.

The following discussion depicts a step-by-step process with consecutive planning factors. In actuality, several "steps" may be planned concurrently in whole or part.

STEP 1 — Obtain intelligence of enemy and the obstacle.

The division and corps intelligence systems intensify collection of specific elements of information about the enemy and the river. Sources outlined in appendix C are utilized.

STEP 2 — Develop tactical concept and bridgehead objectives.

The division staff, during analysis of the corps-directed mission, begins the "inverse" planning sequence by reviewing the requirements to *secure the bridgehead* and the *advance from the exit bank.*

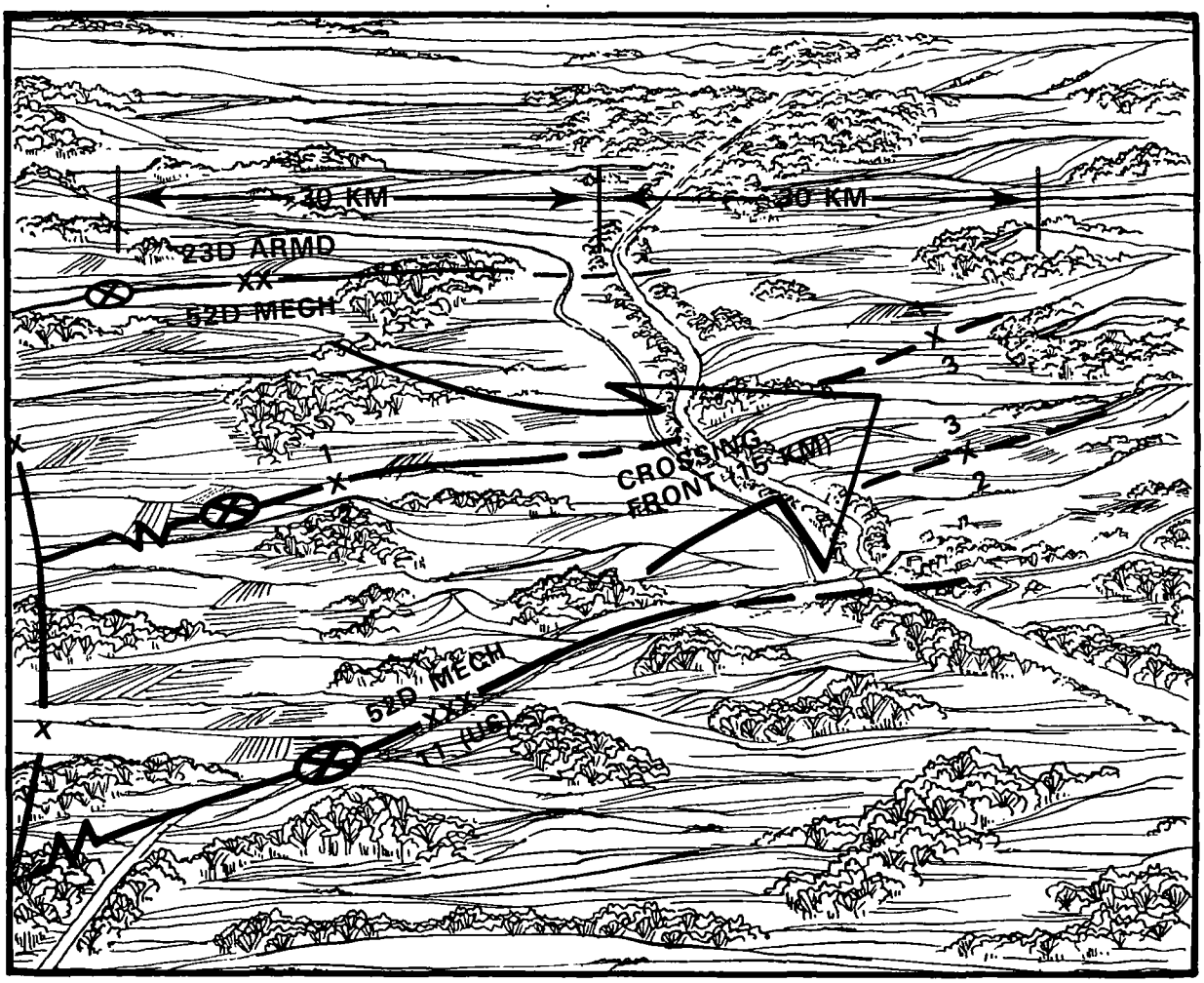
Tentative decisions are made concerning:

- Bridgehead size.
- Objectives which, when secured, control the area.
- Avenues of approach.
- Formation and composition of force(s) required and necessary support.
- Probable enemy counterattacks: location, strength, effect on friendly operations.
- Intermediate objectives.
- Control measures: boundaries, report lines, etc.
- Size of crossing front (if corps has not specified).

To coordinate with concurrent planning of the deliberate attack being supervised by the CG, the crossing force staff now meets with the CG. They inform him of the advantages and disadvantages of several courses of action and advise that a deliberate crossing must be made because of the requirement for additional corps assets.

The basic tactical course of action is selected prior to the development of detailed assault crossing locations, schedules, and capabilities. Preferably, the tactical concept to be executed on the exit bank "drives" the assault crossing plan, including crossing site locations. Thus, the best crossing locations may not be used. There are exceptions. For example, the speed desired for this deliberate crossing may result in a marked change in the attack direction to utilize crossing sites requiring minimal effort to prepare. Similarly, the severity of the obstacle and enemy situation may require that the tactical concept conform to a few crossing sites providing the physical capability to cross the river.

The course of action and concept briefed to and modified by the CG, 52 Mech Division, included current status, and *estimated* friendly and enemy dispositions after successful penetration of the enemy's main defensive belt. The concept visualizes a division crossing front of 15 kilometers with two brigades making the assault crossing. The 1st Bde is in the north and the 2nd Bde is in the south. The 3d Bde is committed to follow the 2nd Bde with the mission: "support the 2nd Bde crossing with overwatching fires; be prepared to assume the 2nd Bde mission." The concept includes an air assault by one company in the 2nd Bde sector. The crossing is to be made on a narrow front initially (two brigades); once across, all three brigades attack abreast to secure the bridgehead.



STEP 3 — Identify crossing areas and sites.

In coordination with the lead assault brigades, it has been determined that:

- Crossing areas will correspond to the brigade lateral boundaries.
- Crossing area commanders (CACs) will be the XO of the 1st Bde and the ADC for support in the 2nd Bde/3d Bde crossing area. (Using the ADC for support was considered necessary because two-thirds of the division's combat power is committed in the southern sector, and either 2nd or 3d Bde may lead the assault crossing.)

- Two battalion-size assault/swimming sites are required in each brigade's crossing area.
- Three heavy raft sites are necessary in each crossing area.
- One bridge site will be established in each crossing area.

STEP 4 — Evaluate river/crossing site reconnaissance.

Engineers and other intelligence sources have been gathering and correlating information of feasible crossing sites. The desirable characteristics as detailed in appendix C include:

All sites

- **Good access/egress roads.**
- **Narrow portion(s) of the river.**
- **Low river velocity and adequate depth.**
- **Firm and gently sloped banks.**
- **Cover and concealment.**
- **No obstacles in approaches, exits, or in the river bed.**
- **Avoids enemy defenses.**

Assault crossing sites

- **Located in a salient in the friendly front (loops and bends in the river).**
- **Dominant terrain on entry bank.**

Raft sites

- **Close to assault/swimming sites.**
- **Downstream of bridge sites**

Float bridge sites

- **Upstream from raft sites.**
- **Adequate assembly areas.**
- **Good anchorage and dispersal conditions.**

The crossing force engineer consolidates data acquired by the division and corps intelligence systems on tentative and/or feasible crossing sites. Physical reconnaissance is desirable to confirm supporting intelligence sources.

STEP 5 — Select crossing sites.

From the several sites compared, the assault force commanders (lead brigade commanders) selected the following sites. Recommendations by assault battalion, brigade engineer, and CACs were considered. The CG approved the site selections.

TYPE	1st BDE	2nd BDE
• ASSAULT/SWIMMING	2, 3	5, 7
• HEAVY RAFT	1, 3, 4	5, 6, 7
• BRIDGE	3	7

CROSSING SITE COMPARISON

* * * SITE 2 * * *	* * * SITE 6 * * *
ENTRY/EXIT – Excellent access roads to site from major routes. – Tree coverage conceals approaches but not exits. – Approach area to site is 1200m wide. * * * RIVER CONDITIONS – Width: 90 meters. – Depth: 3 meters. – Velocity: 1.1 meters. – Entry bank 0.5m w/approach slope 20%. – Exit bank stable & sloped at 10%. * * * OBSTACLES – Some small tree clearing required on entry bank. – Enemy artillery registered at road junction (522124) on exit bank. * * * REMARKS – Good assault/swim site.	ENTRY/EXIT – Approach paths from Rt 3 need widening–300m length. – Assembly areas limited to company size. Five areas within 1000m of site on entry bank. – Exit bank clear with no trees. * * * RIVER CONDITIONS – Entry bank vertical 0.5m slope 10%, no obstructions. – Exit bank appears soft. Needs stabilization. * * * OBSTACLES – Enemy has mined exit banks according to POWs. – Suspected direct fire capability from small village (651654) 800m from site. * * * REMARKS – Estimated site preparation is 30 min by reinforced engr squad. – Good raft or bridge site once obstacles and enemy direct fire reduced.

STEP 6 — Determine vehicle crossing capability.

The crossing force engineer, having checked with his crossing site engineers, coordinated with the division operations officer concerning operational times for rafts and bridges. The engineer estimated an average of one-half hour and one hour site preparation for raft and bridge sites, respectively. The G-3, having coordinated with the lead assault brigades, estimated that one hour after crossing the LD (2-3 km from the river), direct fire would be adequately suppressed to permit raft assembly. Based on the terrain and enemy tactics, he estimated another one-half hour before enemy observed indirect fire would be suppressed. The G-3 estimated that lead brigades would reach the LD by early afternoon with approximately five hours of daylight remaining. Thus, raft assembly will begin at H+1 hour and bridge assembly at H+1 ½ hours.

Corps has provided one M4T6 float bridge company and one RIBBON bridge company. Considering the division's MAB company, the available crossing means follow:

AVAILABLE CROSSING MEANS

UNIT	LTR SETS	MAB BAYS	M4T6 SETS	RIBBON BAYS
• E/52 Engr (MAB)	2	16/8 (144m)		
• 5045 Engr Co (RIBBON)				30/12 (213m)
• 5050 Engr Co (FLT BRG-M4T6)	6		5 (213m)	
• 1st PLT 5070 Engr Co (MAB)		8/4 (85m)		
• TOTAL	8	24/12	5	30/12

If all available means were used as rafts, the capability is as follows:

RAFTS	VEHICLES CROSSED PER TRIP			
	< CL 12		> CL 12	
	PER RAFT	TOTAL	PER RAFT	TOTAL
LTR-8	1	8	NA	NA
MAB-6	4	24	2	12
RIBBON-6	4	24	2	12
M4T6-10	2	20	1	10

If all available means were used as bridges, two bridges of each type (MAB, RIBBON, & M4T6) could be assembled since the sites are 95 and 105 meters wide. The crossing rate is 400 vehicles per hour during daylight, and 200 vehicles per hour at night. Assembly was assumed to begin at H+1 ½, with completion at H+2 ½ hours. Actual assembly is estimated at 40 minutes, and site preparation at one hour.

To estimate which combination of rafts and bridges best supported the tactical plan, the engineer first obtained the number of vehicles for each major unit. (This information should be available by type battalion/unit and contained in the SOP.) Adjustments because of operational status of amphibians and task organizations are included.

ADJUSTED TOTAL VEHICLES

UNIT	AMPHIBIANS	< CL 12	> CL 12
1st BDE	261	275	314
2ndBDE	307	279	268
3d BDE	113	125	140
DIV ARTY	168	210	220
1-23 CAV	91	61	50
DIV TRP	64	461	135
DISCOM	24	354	139
DIV TAC CP	2	8	2
DIV HQ		9	11
TOTAL	1030	1782	1279

Next the engineer estimated vehicle crossing capabilities for various combinations of equipment use.

From the chart on page E—10, the data indicates that the use of two MAB bridges plus rafts (case 2) provides sufficient capability to cross the division by H+5 ¼ hours. Use of RIBBON in lieu of MAB produces equal results. Employing the equipment of Case 1 requires another two hours, with completion at H+7 ¼. The advantage of the MAB and RIBBON over the M4T6 is the rapid assembly rate. If all equipment were used as rafts, the crossing would be complete at H+10.

The engineer recommended the employment of two MAB bridges plus rafts. It provides a build-up of combat power on the exit bank at a rate which meets the requirements of the tactical concept. It provides flexibility by using several rafts and a type bridge (MAB) which is easily changed from bridge to raft.

VEHICLE CROSSING CAPABILITY
(shown are two possible cases)

CASE	MEANS	CAPABILITY TRIPS/HR DAY	CAPABILITY TRIPS/HR NIGHT	VEH/HR (CL 12) CL 12 DAY	VEH/HR (CL 12) CL 12 NIGHT	CUMULATIVE NUMBER VEHICLES CROSSED — DAYLIGHT — TIME (H HOUR PLUS) H+1	H+2	H+3	H+4	H+5	NIGHT H+6	H+7	H+8
1 TWO M4T6 BRG plus RAFTS	8 LTR[1]	8	5	(64) / NA	(40) / NA	(32) / NA	(96) / NA	(160) / NA	(224) / NA	(264) / NA	(304) / NA	- - -	
	6 MAB[1]	8	5	(192) / 96	(120) / 60	(0) / 48	(0) / 144	(0) / 240	(0) / 336	(104) / 343	(240) / - - -	- - -	
	6 RIB[1]	8	5	(192) / 96	(120) / 60	(0) / 48	(0) / 144	(0) / 240	(0) / 336	(120) / - - -	(224) / - - -	- - -	
	2 M4T6[2] BRG	400	200	(800) / 800	(400) / 400	(0) / 0	(0) / 0	(0) / 0	(200) / 600	(600) / - - -	(1000) / - - -	(14) / - - -	
TOTAL						(32) / 96	(96) / 288	(160) / 480	(424) / 1272	(1088) / 1279	(1768) / - - -	(1782) / - - -	

NOTE: 1. Sita preparation tima govarns time raft becomes oparational.
2. Site praparation and M4T6 bridge construction concurrent baginning at H+1. M4T6 floats praassemblad and transportad by truck and/or halicoptar.

2 TWO MAB BRG plus RAFTS	8 LTR[1]	8	5	(64) / NA	(40) / NA	(32) / NA	(96) / NA	(160) / NA	(224) / NA	- - -	
	10 M4T6[2]	8	5	(160) / 80	(100) / 50	(0) / 0	(0) / 0	(160) / 0	(320) / 0	- - -	
	6 RIB[1]	8	5	(192) / 96	(120) / 60	(0) / 48	(0) / 144	(0) / 240	(192) / - - -	- - -	
	2 MAB[1] BRG	400	200	(800) / 800	(400) / 400	(0) / 0	(0) / 400	(161) / 1039	(961) / - - -	(85) / - - -	
TOTAL						(32) / 48	(96) / 544	(481) / 1279	(1697) / - - -	(1782) / - - -	

NOTE: 1. Site praparation tima governs raft and bridge opaning timas.
2. Sita praparation and M4T6 raft assambly concurrant beginning at H+1. Rafts praassambled and transportad by truck and/or helicopter.

STEP 7 — Assign units/assets to sites

Based on the division concept, units will cross in the following areas and sequence:

CROSSING AREA WHITE

(Sites 1-4)	Div Arty (2/3)
1st Bde	Div Trp
1/23 Cav	Div HQ

CROSSING AREA BLUE

(Sites 5-7)	3d Bde
2nd Bde	Div Arty (1/3)
Div Tac CP	DISCOM

The engineer determines equipment requirements for each crossing area and site in a manner similar to STEP 6. These estimates may be made by the crossing force engineer, crossing area engineers, or crossing site engineers. Operations fully

planned at division level usually require the crossing force engineer and staff to complete the estimate. Preferably, the crossing area and crossing site engineers plan equipment utilization and capabilities in a crossing area.

The crossing area engineers determine vehicle crossing capability for each site based on a tentative equipment allocation by the crossing force engineer and coordinate the capability with the requirements of assault battalions at each site. The results are matched with the brigade tactical concepts. The crossing area engineers then estimate crossing capabilities for units following the lead brigades. Adjustments are made as required.

In this example, it was agreed that the following allocation best served the division and brigade tactical concepts:

- **LTR: Two rafts each at Sites 2, 3, 5, 7.**
- **RIBBON: Two rafts at Site 1, four rafts at Site 5.**
- **M4T6: Five rafts at Site 4, five rafts at Site 6.**
- **MAB: One bridge each at Sites 3 and 7.**

The requirement to accelerate the crossing in the 2nd Bde area resulted in more assets allocated.

A crossing schedule is developed to indicate the time that units/elements are to arrive at crossing sites.

STEP 8 — Determine crossing support force requirements.

The basic requirement for crossing support includes engineer, military police, communications, security, and combat service support.

• **ENGINEER.** The MAB and RIBBON are assembled by organic bridge crews; however, each LTR and M4T6 raft requires one assembly platoon each (or nine platoons). Site preparation and maintenance and operation of engineer regulating points require three additional platoons. Thus, each crossing area is supported by 12 platoons (or 1 corps engineer battalion).

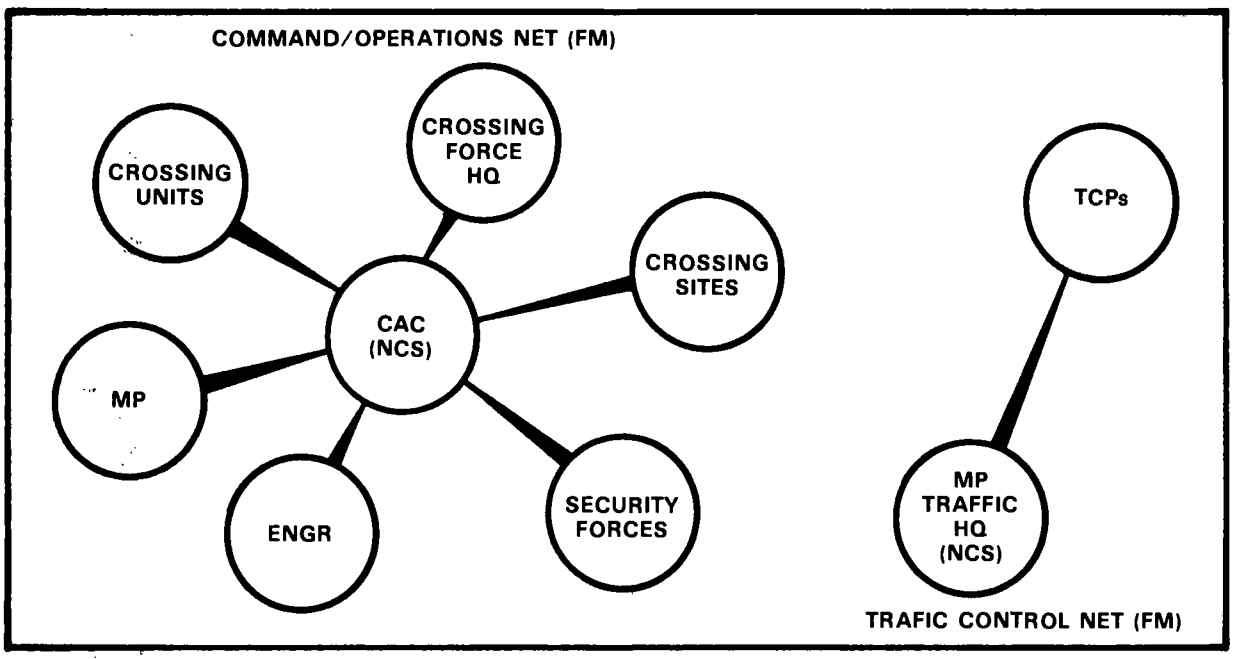
MILITARY POLICE. Traffic control posts and critical areas designated by the CAC are manned by divisional MPs augmented by corps MPs as required. The normal MP platoon supporting each brigade is reinforced by a platoon from corps. The corps unit will gradually assume responsibility on the entry bank as the lead brigade advances on the exit bank.

SECURITY FORCES. The enemy's contemplated disorganized status reduces the requirement for dedicated security. The narrow crossing front and number of sites involved require a reaction force capable of providing small arms and antiarmor fires. Each bridge in this example is protected by one platoon, with a third platoon and company headquarters located in the southern crossing area. Responsive to the CAC, the security force will cross after the entire division in order to provide protection against guerrilla activity.

Routes and assembly areas are designated in the traffic control annex. The annex depicts TCPs, crossing sites, and essential control measures.

COMBAT SERVICE SUPPORT. Refueling points, vehicle retrieval and repair teams, and medical evacuation teams are positioned to limit confusion and congestion within the crossing area.

COMMUNICATIONS. The CAC controls forces in the crossing area by wire, radio, messenger, or other means. Two FM radio nets are activated to support the crossing as shown .



Engineers manning regulating points are co-located with TCPs and use the same communications system.

APPENDIX F

retrograde planning considerations

This appendix provides in a simplified outline *some* of the factors which are considered by planners at all levels prior to the conduct of a retrograde river crossing. The selected planning factors listed in this appendix are considered at appropriate echelons as required.

PLANNING CONSIDERATIONS	
PRELIMINARY CONSIDERATIONS:	
ALERT	Advance warning to subordinate elements.
INTELLIGENCE	Enemy situation, capability and probable courses of action.
GUIDANCE	Extensive reliance on SOP.
DELAY	
MISSIONS	Time or terrain-restrictive missions assigned.
FORCES	Assure that sufficient forces are assigned to effect the required delay.

CONTROL MEASURES	Develop and depict measures necessary to control the delay.
MOBILITY	Consider: —Terrain —Weather —Obstacles
COMBAT SUPPORT	Mixed FA calibers Positioned well-forward, echeloned to provide continuous fires, possibly attached. Mix of ADA systems. HAWK in DS role. SMOKE.
CROSSING SUPPORT	
MISSIONS	Preparation/maintenance of crossing sites, operation of sites, installation removal, destruction of crossing equipment. Control of refugees in crossing area.
FORCES	Engineer, military police, signal.
CONTROL MEASURES	Assembly areas, release lines, traffic control points, communications.
MOBILITY	Trafficability within crossing area, lateral movement between crossing sites and assembly areas.
COMBAT SUPPORT	Wire communication. Engineer capability for site improvement. Use of Army Aviation assets. Air Defense availability.
DEFEND	
MISSIONS	Establish defense to overwatch crossing of remainder of force.
FORCES	Initially limited in size. Cannot be strong at all points.
CONTROL MEASURES	Detailed coord with crossing area support forces. Flexible and reliable communications (wire and messenger). Lateral movement within defensive area will be required. Organic transport limited. Helicopter assets availability.
COMBAT SUPPORT	Availability of non-organic engineer support, air defense forces, and military police. Control of civilians and refugees in area.

APPENDIX G

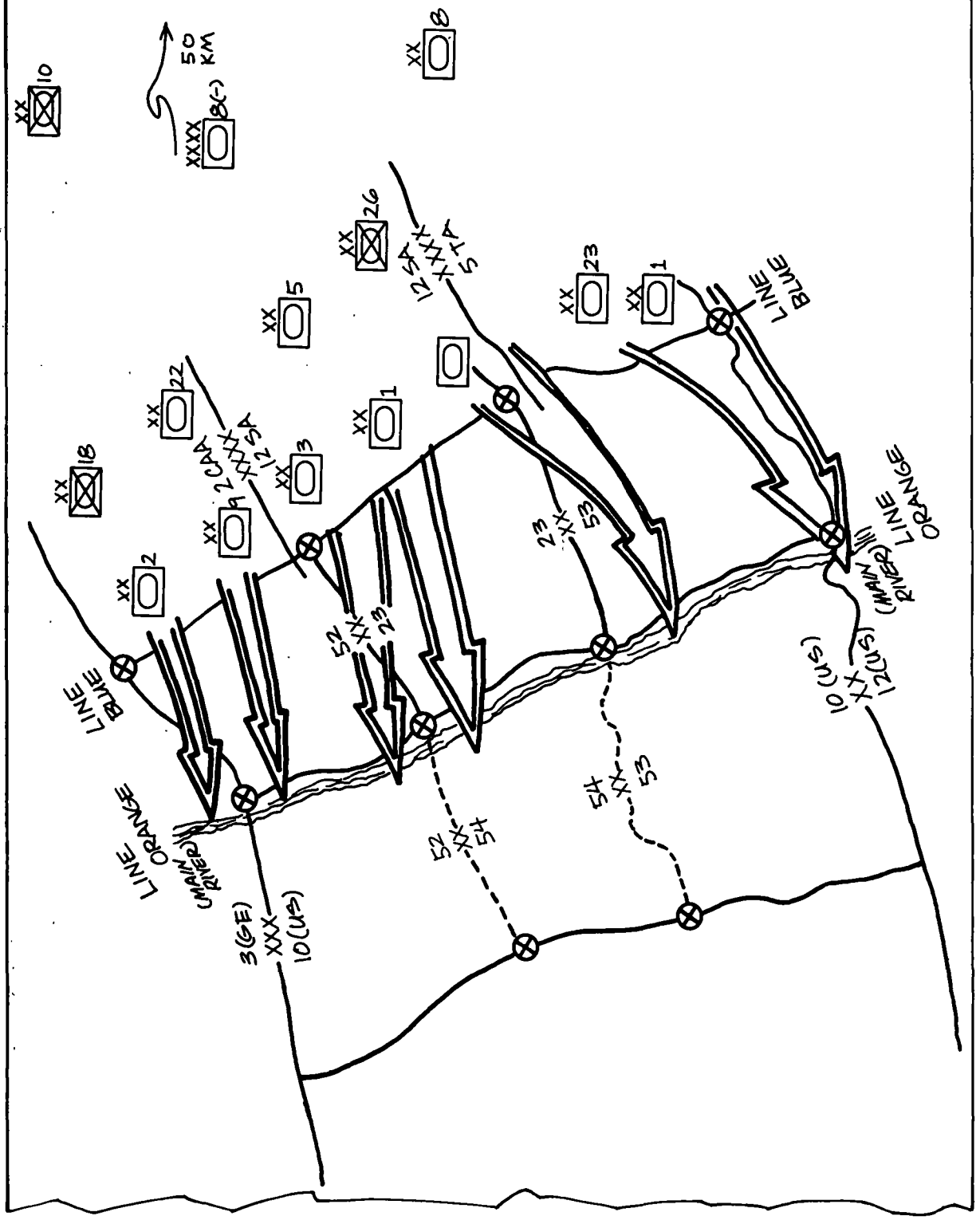
type retrograde crossing order

This appendix provides a general situation and concept for a retrograde river crossing. It provides portions of a corps general situation, commander's concept, and elements of a division retrograde crossing order. While tactical considerations are not discussed, they correlate to the concepts in chapter 4. The technical planning considerations are omitted, but are similar to those found in appendix E.

The style, format, and general content of this order are appropriate for either an offensive or retrograde crossing; and therefore, they may be applied to appendix E (Offensive Crossings).

The appendix is illustrative in content, although it deals with a specific area. It demonstrates one method of many, and is provided to assist planners at corps, division, and lower levels.

Annex A (Enemy Disposition) to Intelligence Estimate No 6-X(US) Corps.


50 KM
XXX
XX 10
XX 18
XX 2
XX 22
XX 4
2 CAV
XX 12
XX 3
XX 5
XX 26
XX 8
XX 1
XX 23
XX 1
XX 5
XX 3
XX 2
XX 4
XX 5
XX 5
XX 5

GENERAL SITUATION

Selected excerpts of the corps situation and operation follow.

The 10th (US) Corps is conducting an active defense against elements of three armies.

- Corps Commander's Guidance and concept:

"The corps mission, effective 141800 July, is to conduct delay operations in sector and defend along line GIESSEN—FRIEDBERG—OBERNBURG A MAIN not later than 160400 July. We will need about 36 hours to prepare the defense and move forces into the new positions.

Enemy has committed his 2d echelon combined arms army (CAA) against our northern sector and intelligence feels the CAA commander is making an all-out effort to force a breakthrough and envelop our northern flank.

There is also increased pressure in the south against units of the 53d Mech Div.
* * *

In the south, 53d Mech Div will be conducting a retrograde crossing of the MAIN River. We must not allow enemy the opportunity to pursue, conduct simultaneous crossings, or destroy our forces crossing the MAIN.

Additional corps aviation, engineer, field artillery, ADA, and military police will be provided to assist the 53d Mech Div crossing. TAC AIR must also be provided to strike enemy long-range fire capabilities, armor, and 2d echelon forces in that order of priority. The enemy must be denied the ability to bring fires on our crossing sites.

Stress planning—detailed planning—and be exact. We must be prepared for all likely contingencies including mass attack tactics, airmobile and airborne operation at river crossing sites and to our rear, and enemy use of chemical agents. Enemy electronic warfare (EW) may decrease our ability to communicate; our plans, therefore, must anticipate these problems, address contingencies, and stand without additional explanation."

EXCERPTS OF 10TH (US) CORPS OPORD 3.

Copy___of___Copies
10th (US) Corps
WIESBADEN (MA4747) GERMANY
141500 July 197
AZ3

OPORD 3–10th (US) Corps

Reference: Map, series GERMANY, sheets * * *

Time Zone * * *

Task Organization: Annex A (Task Organization).

1. SITUATION

a. Enemy Forces Annex B (Intelligence).

b. Friendly Forces.

* * *

c. Attachments and Detachments. * * *

2. MISSION

Effective 141800 July, corps conducts delay operations in sector; defends along line GIESSEN–FRIEDBERG–OBERNBURG A MAIN (MB7008 to MA1020) NLT 160400 July.

3. EXECUTION

a. Concept of Operation. Annex C (Operation Overlay).

(1) Maneuver. Corps conducts retrograde operations and defends in sector from MB7008 to MA1020 (line ORANGE). Operations will be conducted in two phases.

(a) Phase I. Effective 141800 July, corps conducts retrograde operations in sector with the 52d Mech Div, 23d Armd Div, and 53d Mech Div deployed from north to south. The 53d Mech Div will conduct a retrograde crossing of the MAIN River; delay enemy forward of line ORANGE until 160400 July. The 54th Mech Div (-) is corps reserve; priority of employment in sector of 23d Armd Div. Priority of corps engineer assets to 53d Mech Div.

(b) Phase II. Corps defends in sector from M

* * *

(2) Fires. Annex * * *

(d) ADA

c. 53d Mech Div.

(1) Phase I.

(a) Delay in sector forward of MAIN River (line ORANGE) until 160400 July.

(b) Conduct retrograde crossing of MAIN River.

(c) Be prepared to receive attachment of one corps FA battalion; receive OPCON of one attack helicopter company, one combat aviation battalion with assault helicopter company and one assault support helicopter company; one engineer company (E/54th Engr Bn), one MP company and one movement control element; receive OPCON of one corps engineer task force in support of retrograde river crossing operation.

(2) Phase II.

j. 51st Engr Bde.

(1) Phase I.

(a) Priority of employment to 23d Armd Div and maintenance of RHINE River bridges/crossing sites on order.

(b) Provide river crossing task force with control HQ OPCON to 53d Mech Div.

(c) Provide demoli during phases I and II.

Annex L (Deception).

(7) Annex M (Electronic Warfare).

4. SERVICE SUPPORT

a. Annex N (Admin/Log).

b. COSCOM supports from:

* * *

(3) Provide movement control element OPCON to 53d Mech Div during phase I to assist in retrograde river crossing. Be prepared to receive movement control elements from 53d Mech Div during Phase II.

5. COMMAND AND SIGNAL * * *

(U) ANNEX A (TASK ORGANIZATION) to OPORD 3-X (US) CORPS

* * *

53d Mech Div

1st Bde

2-2 Armor
2-76 Mech
2-77 Mech
2-3 Armor
2-40 FA Bn (155,SP) (DS)
A/53 Engr

DIV TRPS

3-23d Cav Sqdn
206th Atk Hel Co (OPCON) (det eff phase II)
2-441st ADA Bn (C/V)
2-461st ADA Bn (Hawk IMP) (DS) (phase I)
110th Cbt Avn Bn (OPCON) (det eff phase II)
53d Avn Co
53d Engr Bn
550th Engr Cbt Bn (Hv) (DS) (phase I)
503d Engr Cbt Bn (Corps) (OPCON) (Phase I)
512th Engr Comp Bn (Corps) (DS) (Phase I)
E/54th Engr Co (OPCON phase I)
E/23d Engr Co (OPCON phase I)
53d CBTI Co (Div)
Spt Co
(det eff phase II)

ANNEX G (ENGINEER) to OPORD 3-X (US) Corps

2. MISSION

Effective 141800 July, corps engr units support 10th (US) Corps in the conduct of retrograde operations and defense in sector from MB7008 to MA1020 (Line ORANGE) by emplacement of obstacles, preparation of defensive (blocking)

, prepare and e

uct of denial operations.

3. EXECUTION

a. Concept of Operations.

(1) Para 3a,

(2) Corps engr units spt 10th (US) Corps in the conduct of retrograde operations and defense in sector. Engr spt for the two phased ops will include:

(a) Phase 1

(1) * * *

(2) Provision of river crossing task force with control HQ OPCON to 53d Mech Div.

(3) Spt of retrograde river crossing op of the 53d Mech Div through construction and maint of brg, rafting and amphibious crossing sites and their approaches.

(4) Prov of dml spt to 10th COSCOM as required.

rea and task basis to include

(c) Priority of Effort:

b. 51st Engr Bde.

(1) Phase I

(a) Command all nondivisional engr units.

(b) Activate HHD TF RAY.

(c) Atch to TF RAY one engr cbt bn (Hv) and engr bn (Svc):

(d) Provide 1 cbt bn (corps) OPCON to 53d Mech Div.

(e) Provide TF RAY OPCON to TF DAVE.

DIVISION RETROGRADE OPORD (River Crossing)

Copy___of___copies
53d Mech Div
DARMSTADT (MA7626)
141600 July 19
AD 15

OPORD 5–53d Mech Div
Reference: Map, series GERMANY, sheets L5912, 5914, 5916, 5920, 5922, 6112, 6114, 6116, 6118, 6120, 6122, 6312, 6314, 6316, 6318, 6320, 6322, edition 1, 1:50,000.

Time Zone Used Throughout the Order: ALFA.

Task Organization:

PHASE I: Delay

Task Force Dave (Crossing Force Hqs)
- TF Ray (Corps Engr) (OPCON)
  - 550 th Engr Cbt Bn (Hv)
  - 512th Engr Comp Bn (Corps)
    - 5035th Engr Pnl Brg Co
    - 5080th Engr Cbt Spt Equip Co
    - 5045th Engr Aslt Fltbrg Co (Ribbon)
    - 5071st Engr Aslt Fltbrg Co
  - E/54th Engr Bn (OPCON)
  - E/53d Engr Bn (OPCON)
  - 279th MP Co (OPCON)
  - Corps Mov Con Em (OPCON)

Task Force Pete
- TF 2-77 Mech
- TF 2-80 Mech
- 3-23 Cav (-) (Div Res)
- TEAM TOM (Engr)
- Signal Det
- 1/28lst MP Co

1st Bde
- TF 2-76 Mech
- TF 2-2 Armor
- TF 2-3 Armor
- 206th Atk Hel Co (-)
- 2-40 FA Bn (155,SP) (DS)
- A/53d Engr Bn

2d Bde
- TF 2-78 Mech
- TF 2-79 Mech
- TF 2-4 Armor
- 2-41 FA Bn (155,SP) (DS)
- B/53d Engr Bn

3d Bde
- TF 2-81 Mech
- TF 2-5 Armor
- 1/206th Atk Hel Co
- 2-42 FA Bn (155,SP) (DS)
- C/53d Engr Bn

Div Arty
- 53d Sig Bn (-)
- 334th Cml Det (CBRE)

DISCOM
- 53d AG Co
- 53d Fin Co
- 53d Maint Bn
- 53d Med Bn
- 53d S&T Bn

PHASE II: Covering Force

Task Force Pete
- TFP2-77 Mech
- TF 2-80 Mech
- 3-23 Cav (-)
- TF 2-2 Armor
- TF 2-5 Armor
- 206th Atk Hel Co
- Div Arty TAC CP (OPCON)
  - 2-40 FA Bn (155,SP)
  - 2-41 FA Bn (155,SP)

(OPORD 5–53d Mech Div)

2-42 FA Bn (155,SP)
1-651 FA Bn (155,T)
2-43 FA Bn (8,SP)
2-606 FA Bn (8,SP)
2-662 FA Bn (175mm)
C/101 FATAB
178th Aslt Hel Co (Sep) (OPCON)
TEAM TOM (Engr)
Signal Det
1/281st MP Co
Task Force Dave (Crossing Force Hqs)
add 281st MP Co (-)
1st Bde
TF 2-76 Mech
TF 2-3 Armor
A/53d Engr Bn
2d Bde
TF 2-78 Mech
TF 2-79 Mech
TF 2-4 Armor
B/53d Engr Bn
3d Bde
TF 2-81 Mech
C/53d Engr Bn
Div Arty (-)
Div Trps
D/3-23 Cav
2-441 ADA Bn (C/V)
2-461 ADA Bn (Imprv Hawk) (DS)
110th Cbt Avn Bn (-) (OPCON)
53d Avn Co
53d Engr Bn (-)
503d Engr Cbt Bn (Corps) (DS)
53d CBTI Co (Div)
53d ASA Co (Div)
53d MP Co
53d Sig Bn (-)
334th Cml Det (CBRE)
DISCOM
* * * * *

PHASE III: Defend

Task Force Dave
add 1/281st MP Co
1st Bde
TF 2-76 Mech
TF 2-2 Armor
TF 2-3 Armor (Div res upon crossing Main River)
A/3-23 Cav (Detached after crossing Main River)
2-40 FA Bn (155,SP) (DS)
A/53d Engr (DS)
2d Bde
TF 2-77 Mech (Atch at Holding line)
TF 2-78 Mech
TF 2-79 Mech
TF 2-4 Armor
3-23 Cav (-)(Div res upon crossing Main River)
2-41 FA Bn (155,SP) (DS)
B/53d Engr (DS)
3d Bde
TF 2-80 Mech
TF 2-81 Mech

(OPORD 5—53d Meoh Div)

TF 2-5 Armor
C/3-23 Cav (Detached after crossing
Main River)
2-42 FA Bn (155,SP) (DS)
C/53d Engr (DS)
Div Arty
2-43 FA Bn (8,SP)
2-606 FA Bn (8,SP)
1-651 FA Bn (155,T)
2-662 FA Bn (175mm)
C/101 FATAB
Div Trps
206th Atk Hel Co (OPCON)
D/3-23 Cav
2-441 ADA Bn (C/V)
2-461 ADA Bn (Imprv Hawk) (DS)
110th Cbt Avn Bn (OPCON)
53d Avn Co
53d Engr Bn (-)
503d Cbt Engr Bn (Corps) (OPCON)
53d CBTI Co (Div)
53d ASA Div Spt Co
53d MP Co
53d Sig Bn (-)
334th Cml Det (CBRE)
DISCOM
* * * * *

1. SITUATION

a. Enemy Forces. Annex A (Intelligence).

b. Friendly Forces.

(1) The X (US) Corps conducts delay operations in sector and defends along line GIESSEN—FRIEDBERG—OBERNBURG A MAIN NLT 0400 July. The 52d Mech Div is in the north, 23d Armd Div in the center, and 53d Mech Div in the south.

(2) The XII (US) Corps retrogrades in the south.

(3) The 24th ATAF supports 53d Mech Div with 25 close air support (CAS) sorties from 1800 to 0400 July.

(4) The 206th Atk Hel Co, 110th Cbt Avn Bn, TF RAY (Corps Engr) E/54th Engr Bn, 297th MP Co, and movement control element OPCON to division, effective 141500 July.

c. Attachments and Detachments.

(1) The 2-662 FA Bn (175mm) attached, effective 141500 July.

(OPORD 5–53d Mech Div)

d. Assumptions.

(1) Supporting units will be available for employment on 141600 July.

(2) The 24th ATAF can maintain local air superiority over river crossing sites until brigade covering forces withdraw from the holding line.

(3) FRG forces, military and civil, will assist in refugee control.

(4) Fixed bridges on the MAIN River in 53d Mech Div sector have been destroyed.

2. MISSION

Effective 141800 July, div delays in sector forward of MAIN River (line ORANGE) until 160400 July; conducts crossing of MAIN River; then defends in sector from MA932532 to MA106205.

3. EXECUTION

a. Concept of Operation. Annex B (Operation Overlay).

(1) Maneuver. Division conducts delay operations forward of MAIN River until 160400 July. Division then crosses MAIN River and defends in sector, conducting this operation in three phases.

(a) Phase I. Commencing 141800 July, 1st, 2d, and 3d Bdes delay enemy forward of line BLACK until 142200 July. TF Pete, division covering force, occupies initial delay position, by infiltration, along line BLACK not later than 142130 July. TF DAVE, division crossing force headquarters, is activated and begins to direct the preparation of the crossing areas.

(b) Phase II. 1st, 2d, and 3d Bdes withdraw through TF PETE, conduct crossings MAIN River and occupy new defensive sector; defend in sector. After passage of brigades, TF PETE defends line BLACK for five hours then delays enemy forward of holding line until 152200 July. TF PETE is dissolved at holding line. MBA brigades assume control of TF PETE maneuver elements; be prepared to defend holding line.

(c) Phase III. MBA brigades continue delay to the MAIN River and on order complete retrograde river crossing NLT 160330 July; defend in sector, 1st Bde on the north, 2d Bde in the center, and 3d Bde in the south. Upon completion of retrograde river crossing, TF DAVE is dissolved; TF Ray (Corps Engr), 297th MP Co, Corps movement control element, 206th Atk Hel Co and 110th Cbt Avn Bn released to corps control; E/54th Engr Bn released to parent unit control; 503d Engr Cbt Bn (Corps) released to div control; TF 2-3 Armor and 3-23 Cav Sqdn become division reserve. Priority of employment of 2-3 Armor to 2d and 1st Bde in order. Priority of employment 3-23 Cav Sqdn to sector 2d and 3d Bde in order.

(OPORD 5–53d Mech Div)

(2) Fires. Annex C (Fire Support).

(a) Air.

1. Phase I. Priority to 1st Bde.
2. Phase II. Priority to TF PETE.
3. Phase III. Initially to brigade covering forces then to 2d Bde.

(b) FA.

1. Phase I. Priority to 1st Bde.
2. Phase II. Priority to TF PETE.
3. Phase III. Priority to brigade covering forces then to 2d Bde after river crossing completed.

(c) ADA.

1. Phase I. Priority to 1st Bde and TF DAVE in order.
2. Phase II. Priority to TF PETE and TF DAVE in order.
3. Phase III. Priority to MBA brigades.

b. TF PETE.

(1) Phase I. Establish initial delay positions along line BLACK NLT 142130 July. Be prepared to release 3-23 Cav (-) as division reserve. Be prepared for OPCON of Team TOM, Sig Det, and 1/281st MP Co.

(2) Phase II. Cover retrograde and assist passage of 1st, 2d, and 3d Bdes. On passage of MBA brigades defend line BLACK for five hours, then delay enemy forward of holding line until 152200 July. Prepare for attachment of two maneuver battalions, one each from the 1st and 3d Bdes; OPCON of 206th Atk Hel Co, 178th Aslt Hel Co (SEP) Team TOM and Div Arty TAC CP with seven FA Bns.

(3) Phase III. On withdrawal through holding line release artillery, aviation, engineer, signal, and MP units to division control. Coordinate release of combat battalions with MBA brigades, then TF PETE dissolved.

c. TF DAVE.

(1) Phase I.

(a) Use existing or TF bridging to support limited resupply of MBA forces, withdrawal of division main CP, DISCOM (-), division troops (-) and civilian refugees.

(b) Use civilian lighterage to supplement organic capability.

(c) Be prepared to establish a minimum of three bridge sites in each brigade sector; a minimum of one raft site will be established for each battalion delaying as part of MBA brigade covering forces.

(OPORD 5–53d Mech Div)

(d) Be prepared to reoeive OPCON of TF RAY (Corps Engr), 279th MP Co, E/53 Engr Bn, E/54 Engr Bn, and corps movement control element.

(2) Phase II.

(a) Support crossing of MBA brigades, combat support, and combat service support units: four mechanized and two armored TFs, one Engr Cbt Bn (Corps), div arty (-), two MP companies, one forward communications company, two fwd spt maint cos, two med cos, and two fwd spt sections (S&T Bn), using existing or TF bridging capabilities.

(b) Insure refugees do not hinder retrograde and resupply operations at river crossing sites.

(c) Prepare any fixed bridges for demolition; destroy on order.

(d) Receive OPCON of 281st MP Co (-).

(e) Be prepared to assist crossing of brigade security forces. Bridges will be used as long as possible for withdrawal of forces.

(f) Be prepared to dismantle or destroy organio bridging on order.

(g) Be prepared to relocate bridging and rafts on order.

(3) Phase III.

(a) Assist crossing of TF PETE and div support units: div arty TAC CP, seven FA battalions, one FATAB, one engr team, one signal detachment, one MP platoon, one fwd maint spt co, one medical company, and one forward support section (S&T Bn).

(b) Assist crossing of brigade covering forces–two mechanized TFs, one armored TF, one cavalry squadron and one Engr Bn (-).

(c) Receive OPCON 1/281st MP Co.

(d) Be prepared to pass control of crossing sites to MBA brigades on order. When all crossing sites are under brigade control TF DAVE is dissolved.

d. 1st Bde.

(1) Phase I.

(a) Effective 141800 July, delay enemy forward of line BLACK until 142200 July.

(b) Provide one mech-heavy TF OPCON to TF PETE.

(c) Receive OPCON of 206th Atk Hel Co (-).

(2) Phase II.

(a) Commencing 142200 July, withdraw in sector through TF PETE vicinity line BLACK; release one tank-heavy task force and 206th Atk Hel Co (-) to TF PETE; withdraw to and oocupy assigned sector vic MAIN River by 150330 July.

(OPORD 5–53d Mech Div)

(b) Reconnoiter battle positions (BP) 1, 2, 7, 8, 14, and 15; be prepared to occupy BPs 1 and 2 with maneuver elements of TF PETE, and defend holding line.

(c) Provide security to crossing area in sector.

(3) Phase III.

(a) TF PETE releases A/3-23 Cav and one tank-heavy TF at holding line.

(b) Continues to delay to the MAIN River and on order cross in sector; complete crossing of MAIN River NLT 160330 July; defending in sector.

(c) Be prepared to provide uncommitted forces to sectors 2d and 3d Bdes on order.

(d) Be prepared to receive control of TF DAVE elements operating in brigade sector on order.

(e) Be prepared to cross equipment at earliest time while bridges are intact.

(f) Provide security to crossing area in sector.

e. 2d Bde.

(1) Phase I. Effective 141800 July, delay enemy forward of line BLACK until 142200 July.

(2) Phase II.

(a) Commencing 142200 July, withdraw in sector through TF PETE vic line BLACK; withdraw to and occupy assigned sector vic MAIN River NLT 150330 July.

(b) Reconnoiter BPs 3, 4, 9, 10, 16 and 17; be prepared to occupy BP 3 and 4 with brigade and TF PETE maneuver elements; defend holding line.

(c) Provide security to crossing area in sector.

(3) Phase III.

(a) TF PETE releases 3-23 Cav (-) at holding line.

(b) Continue delay to MAIN River and on order cross in sector; complete crossing of MAIN River NLT 160330 July; defend in sector.

(c) Be prepared to provide uncommitted forces to sector 1st and 3d Bdes on order.

(d) Be prepared to receive control of TF DAVE elements operating in brigade sector on order.

(e) Be prepared to cross vehicles at earliest time while bridges are intact.

(f) Provide security to orossing area in sector.

f. 3d Bde.

(OPORD 5–53d Mech Div)

(1) Phase I.

(a) Effective 141800 July; delay forward of line BLACK until 142200 July.

(b) Provide one mech-heavy battalion TF OPCON to TF PETE.

(c) Receive OPCON of 1/206th Atk Hel Co.

(2) Phase II.

(a) Commencing 142200 July, withdraw in sector through TF PETE vicinity line BLACK; release one tank-heavy task force and 1/206th Atk Hel Co to TF PETE; withdraw to assigned sector near MAIN River and occupy it by 150330 July.

(b) Reconnoiter BP 5, 6, 11, 12, 13, and 18; be prepared to occupy BPs 5 and 6 with brigade covering force and defend holding line.

(c) Provide security to crossing area in sector.

(3) Phase III.

(a) TF PETE releases one mech-heavy battalion TF and one armor-heavy battalion TF at holding line.

(b) Brigade covering forces continue to delay to MAIN River and on order cross in sector; conclude crossing of MAIN River NLT 160330 July; defend in sector.

(c) Be prepared to receive control of TF DAVE elements operating in brigade sector on order.

(d) Be prepared to cross vehicles at earliest time while bridges are intact.

(e) Provide security to crossing area in sector.

g. 206th Atk Hel Co.

(1) Phase I. Priority to 1st and 3d Bdes in order.

(2) Phase II. OCPON to TF PETE.

(3) Phase III. Priority of commitment to 2d Bde, 3d Bde, and 1st Bde in that order; release to corps control upon completion of retrograde river crossing.

h. D/2-23 Cav. Screen division south flank from FEBA to division rear boundary.

i. Arty.

(1) FA.

(a) Phase I.

1. 2-40 FA Bn (155,SP) DS 1st Bde.
2. 2-41 FA Bn (155,SP) DS 2d Bde.
3. 2-42 FA Bn (155,SP) DS 3d Bde.
4. 2-43 FA Bn (8,SP) GSR 2-41 FA Bn.

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5. 1-651 FA Bn (155,T) Reinf 2-40 FA Bn.
6. 2-606 FA Bn (8,SP) GSR 2-42 FA Bn.
7. 2-662 FA Bn (175mm) GS.
8. C/1-101 FATAB (GS).

(b) Phase II.

1. Div Arty TAC CP, OPCON TF PETE.

a. 2-40 FA Bn (155,SP)
b. 2-41 FA Bn (155,SP)
c. 2-42 FA Bn (155,SP)
d. 1-651 FA Bn (155,SP)
e. 2-43 FA Bn (8,SP)
f. C/101 FATAB
g. 2-606 FA Bn (8,SP)
h. 2-662 FA Bn (175mm)

(c) Phase III.

1. 2-40 FA Bn (155,SP) 1st Bde.
2. 2-41 FA Bn (155,SP) DS 2d Bde.
3. 2-42 FA Bn (155,SP) DS 3d Bde.
4. 2-43 FA Bn (8,SP) GSR 2-42 FA Bn.
5. 1-651 FA Bn (155,T) Reinf 2-41 FA Bn.
6. 1-606 FA Bn (8,SP) GSR 2-40 FA Bn.
7. 2-662 FA Bn (175mm) GS.
8. C/1-101 FATAB GS.

(2) ADA.

(a) Phase I.

1. 2-441 AD Bn (C/V) Priority to 1st Bde.
2. 2-461 AD Bn (Imprv Hawk): Priority to crossing sites over MAIN River.

(b) Phase II.

1. 2-441 AD Bn (C/V). Priority to TF PETE.

2. 2-461 AD Bn (Imprv Hawk): Priority to crossing site over MAIN River and brigade forces in holding line sector in order.

(c) Phase III.

1. 2-441 AD Bn (C/V). Priority to MBA brigades and MAIN River crossing sites in order.

2. 2-461 AD Bn (Imprv Hawk): Priority to MAIN River crossing sites and MBA brigades in order.

(3) Annex C (Fire Support).

(4) Annex D (ADA Fire Support).

(OPORD 5–53d Mech Div)

j. 110th Cbt Avn Bn.

(1) Phase I. Priority of employment to 1st Bde.

(2) Phase II.

(a) Provide OPCON to TF PETE one aslt hel co.
(b) Priority of employment to DISCOM and TF DAVE in order.

(3) Phase III. Priority of employment to MBA brigades and DISCOM in order.

(a) Annex E (Aviation).
(b) Annex F (Airspace Utilization).

k. Engr.

(1) 53d Engr (-)

(a) Phase I. Priority to MBA brigades.
(b) Phase II. Priority to MBA brigades.
(c) Phase III. Priority to MBA brigades.

(2) 503d Engr Cbt Bn (Corps) (OPCON)

(a) Phase I. Priority of effort to obstacles in MBA; MSRs and BPs at holding line.
(b) Phase II. Priority of efforts to obstacles in sector and BPs west of the MAIN River.
(c) Phase III. Priority to MBA Bdes.

(3) Annex G (Engineer).

(4) Annex H (Barrier and Denial).

(5) Annex I (Crossing Plan).

l. Res.

(1) Phase I. On order 3-23 Cav (-): priority of commitment to sector 1st Bde.

(2) Phase II. 2d Bde. Be prepared to release one battalion task force: priority to sector TF PETE.

(3) Phase III.

(a) 1st and 2d Bde. Be prepared to release one battalion TF for division reserve until 2-3 Armor and 3-23d Cav (-) complete crossing of MAIN River.
(b) 2-3 Armor. Upon crossing MAIN River, revert to division reserve near SPRENDLINGEN (MA7840). Be prepared for commitment to sector 2d and 1st Bde in order.
(c) 3-23 Cav (-). Upon crossing MAIN River, revert to division reserve near DIEBURG MA8627. Be prepared for commitment to sector 2d and 3d Bde in order.

(OPORD 5–53d Mech Div)

m. Coordinating Instructions.

(1) Report clearance of lines–BLACK, Holding, and ORANGE.

(2) MBA units prepare all bridges and fords, except MAIN River, for destruction.

(3) Transfer of crossing site control and release of elements TF DAVE to parent units will be on order of this headquarters.

(4) MBA brigades coordinate covering fires during delay from holding line to MAIN River.

(5) Withdraw vehicles without amphibious capabilities first; only vehicles with amphibious capabilities will be utilized by forces covering the final crossing operations.

(6) Generate spoiling attacks on shallow objectives when possible to prevent or slow enemy pursuit. Coordinate with this headquarters prior to execution.

(7) Commencing 142200 July traffic over the MAIN River Crossing sites will be restricted to one way, crossing from east to west. Limited resupply and casualty evacuation will be accomplished by air.

(8) MBA brigades destroy all vehicles, weapons, equipment, and supplies that cannot be retrograded across the MAIN River.

(9) Bridges will be operated as long as possible. Request to close bridges will be initiated by Cmdr TF Dave and coordinated with sector Bde Cmdr.

(10) Dismantling and destruction of crossing means will be approved by this headquarters. Bde cmdrs may destroy to prevent capture.

(11) Conduct close coordination with territorial police for refugee control in sector.

(12) Direct coordination between brigades and TF PETE authorized.

(13) Brigades prepare for attachment of TF PETE maneuver battalions near holding line.

(14) Annex J (Electronic Warfare).

(15) Annex K (Counterattack Plans).

(16) Annex L (Movement Order). Phase I priority of road movements to MBA brigades. Phase II priority to TF PETE. Phase III to MBA brigades initially then to reserve.

(17) Annex M (Deception).

(18) ADC Burgess is CG, TF PETE.

(OPORD 5–53d Mech Div)

(19) ADC Wheeler is CG, TF DAVE.

4. SERVICE SUPPORT

a. Annex N (Service Support).

Prepositioning of classes I, II, III, and V stocks will be maximized in support of delay and defending forces. Air resupply will be used only when directed by operational necessity. Maintenance contact teams will be provided to TF DAVE for timely maintenance support in the crossing areas.

b. Annex O (Civil-Military Operations).

(1) Movement and control of refugees will be closely controlled at crossing sites across the MAIN River. Collection points, routes, crossing means, authorization to move, and movement times will be planned, established, and controlled. When possible indigenous police will be used to control and move refugees.

(2) Assist Cdr TF DAVE in acquisition of indigenous lighterage.

5. COMMAND AND SIGNAL.

a. CEOI_____. Annex P (Communications-Electronics).

b. Div main CP DARMSTADT (MA7726).

c. Div TAC CP.

(1) Phase I. LOHRHAUPTEN (NA3453).

(2) Phase II. KAHL (NA0046).

(3) Phase III. BABENHAUSEN (MA9736).

Acknowledge:

DUNAWAY
MG

OFFICIAL

DAVIS
G3

Annexes:

A–Intelligence (omitted)
B–Operation Overlay
C–Fire Support (omitted)
D–ADA (omitted)
E–Aviation (omitted)
F–Airspace Utilization (omitted)
G–Engineer
H–Obstacle and Denial
I–Crossing Plan
J–Electronic Warfare (omitted)
K–Counterattack Plans (omitted)
L–Movement Order
M–Deception (omitted)
N–Service Support (omitted)
O–Civil-Military Operations (omitted)
P–Communications-Electronic (omitted)

Annex B (Operation Overlay) to OPORD 5-53d Mech Div.
Phase I

Annex B (Operation Overlay) to OPORD 5-53d Mech Div.
Phase II

Annex B (Operation Overlay) to OPORD 5-53d Mech Div
Phase III

ANNEX G (ENGINEER) to OPORD 5–53d Mech Div

Reference: OPORD 5–53d Mech Div

Time Zone Used Throughout the OPORD: ALFA

TASK ORGANIZATION:

Phase I and Phase II
- 53d Engr Bn (-)
- 503d Engr Bn (-) (OPCON)
- TEAM TOM
  - D/53d Engr Bn
  - D/503d Engr Bn (OPCON)
  - AVLB/E/53d Engr Bn
- TF RAY (OPCON)
  - 550th Engr Bn (Hv)
  - 512th Engr Comp Bn (Corps)
    - 5035th Engr Pnl Brg Co
    - 5080th Engr Cbt Spt Equip Co
    - 5045th Engr Aslt Fltbrg Co (Ribbon)
    - 5071st Engr Aslt Fltbrg Co
  - E/53d Engr Bn (-) (OPCON)
  - E/54th Engr Bn (-) (OPCON)

Phase III
- 53d Engr Bn (-)
- 503d Engr Bn (DS)
- TF RAY
  - 550th Engr Bn (Hv)
  - 512th Engr Comp Bn (Corps)
    - 5035th Engr Pnl Brg Co
    - 5080th Engr Cbt Spt Equip Co
    - 5045th Engr Aslt Fltbrg Co (Ribbon)
    - 5071st Engr Aslt Fltbrg Co
    - E/53d Engr Bn (-) (OPCON)
    - E/54th Engr Bn (-) (OPCON)

1. SITUATION

a. Enemy Forces. Annex A (Intel) to OPORD 5–53d Mech Div.

b. Friendly Forces.

(1) Para 1d, OPORD 5–53d Mech Div

(2) Annex H (Obs Plan).

c. Attachments and Detachments. See Task Organization.

d. Assumptions.

(1) Para 1d, OPORD–53d Mech Div.

(2) The division will have occupied the area for 48 hrs and will have initiated preparation of obstacles, demolitions, and obstacles during this time.

ANNEX G (ENGINEER) to OPORD 5-53d Mech Div

2. MISSION

Effective 141800 July, engr units spt the 53d Mech Div in delaying in sector fwd of the MAIN River (Line ORANGE) until 160400 July; spts crossing of the MAIN River; then spts the def in sector from MA932532 to MA106205.

3. EXECUTION

a. Concept of Operations. This operation is conducted in three phases (para 3a, OPORD 5-53d Mech Div).

(1) Phase I. 53d Engr Bn (-) spts delay fwd of Line BLACK until 142200 July. TM TOM spts TF PETE in occupying the IDP Line BLACK NLT 142130 July. TF RAY OPCON to TF DAVE and spts preparation of the crossing areas. 503d Engr Bn (-) spts withdrawal of div spt elements and starts prep of blocking and def pos.

(2) Phase II. 53d Engr Bn (-) spt withdrawal of brigades through TF PETE, prepare fighting pos on the holding line, and be prepared to support defense of holding line. TM TOM spts defense and delay of TF PETE fwd of the holding line until 152200 July then is dissolved and absorbed by the 503d Engr Bn (-). 503d Engr Bn (-) continues to prep def and blocking pos to the west of MAIN River (Line ORANGE). TF RAY continues to spt prep of crossing areas and exec of retrograde crossings.

(3) Phase III. 53d Engr Bn (-) spts the MBA bdes in the delay to the MAIN River (Line ORANGE). TF RAY spts the crossing of all div units across the MAIN River, destroys all nonrecoverable crossing means and sites; and is then released to corps. 503d Engr Bn (+) continues to prep def and blocking pos west of Line ORANGE.

b. 53d Engr Bn.

(1) Attach one line company to each MBA bde eff 141800 July.

(2) Attach one line company and the AVLB plt to TF PETE eff 142100 July.

(3) Attach bridge company (-) to TF RAY eff 141600 July.

(4) Provide potable water in sector.

(5) Improve mobility in sector.

(6) Provide centralized planning and control of all engr units in the div sector.

c. A/53d Engr Bn.

(1) Attached to 1st Bde, eff 141800 July, until 160600 July.

(2) Phase I.

(a) Complete and execute on order obstacles in the 1st Bde area fwd of Line BLACK.

(b) Spt the delay of 1st Bde fwd of Line BLACK.

ANNEX G (ENGINEER) to OPORD 5-53d Mech Div

(c) Enhance mobility of 1st Bde during the delay fwd of Line BLACK.

(3) Phase II.

(a) Spt withdrawal for the 1st Bde through Line BLACK commencing 142200 July.

(b) Spt bde covering forces in the prep of def pos on the holding line.

(4) Phase III.

(a) Spt Bde delay to the MAIN River and the crossing in sector by 160400 July.

(b) Spt the 1st Bde in the def of the MAIN River (Line ORANGE).

(c) Be prepared to assume obstacle construction in the 1st Bde area from A/503d Engr Bn and B/550 Engr Bn on order.

d. B/53d Engr Bn.

(1) Attached to 2d Bde, eff 141800 July, through 160600 July.

(2) Phase I.

(a) Complete and execute on order obstacles in the 2d Bde area fwd of Line BLACK.

(b) Spt the delay of 2d Bde fwd of Line BLACK.

(c) Enhance mobility of 2d Bde during the delay fwd of Line BLACK.

(3) Phase II

(a) Spt 2d Bde delay to the MAIN River (Line ORANGE) and the crossing of the bde in sector by 160400 July.

(b) Spt the 2d Bde in the def of the MAIN River (Line ORANGE).

(c) Be prepared to assume obstacle construction in the 2d Bde area from B/503d Engr Bn and C/550 Engr Bn on order.

e. C/53d Engr Bn.

(1) Attached to 3d Bde eff 141800 July through 160400 July.

(2) Phase I.

Complete and execute on order obstacles in the 3d Bde area fwd of Line BLACK.

(3) Phase II.

(a) Spt withdrawal of the 2d Bde through Line BLACK commencing 142200 July.

(b) Spt bde security forces in the prep of def pos on the holding line.

(4) Phase III.

(a) Spt 3d Bde delay to the MAIN River (Line ORANGE) and the crossing of the bde in sector by 160400 July.

(b) Spt the 3d Bde in def of the MAIN River (Line ORANGE).

(c) Be prep to assume obstacle construction in the 3d Bde area from C/503d Engr Bn and D/550 Engr Bn on order.

f. D/53d Engr Bn.

(1) Accept OPCON of D/503d Engr and AVLB/E/53d Engr to form TEAM TOM during phase I and II.

(2) Phase III.

(a) Dissolve TM TOM.

(b) Assist the A/503d Engr in prep of pos along the MAIN River (Line ORANGE).

g. E/53d Engr Bn.

(1) AVLB Plt OPCON to TM TOM from 142100 July until 152200 July.

(2) OPCON to TF RAY from 141800 July until TF DAVE is disbanded.

(3) Perform those bridging missions designated in annex I to OPORD 5–53d Mech Div.

h. 503d Engr Bn.

(1) OPCON one company to TF PETE (TM TOM) eff 142100 July until 152200 July.

(2) Phase I, spt withdrawal of div spt units across the MAIN River (Line ORANGE).

(3) Phase II, prep def and blocking pos to the rear of Line ORANGE.

(4) Phase III.

(a) Continue prep of def and blocking pos.

(b) Asst crossing of MBA bde over MAIN River.

(c) Be prep to:

1. Assume missions in div rear.
2. Pass obs construction to 53d Engr Bn on order.

i. TF RAY. OPCON to TF DAVE eff 141800 July until 160600 July. Receive atch of following units eff 141800 July (see task org).

(1) 550th Engr Bn (Hv).

(a) Assign one cbt co to ea bde crossing area.

(b) Maintain and improve crossing sites to include all routes indicated in annex L to OPORD 5, 53 Mech Div, between traffic regulating Lines MEL and JAY.

ANNEX G (ENGINEER) to OPORD 5–53d Mech Div

1. Improve entrance and exit sites at all amphibious sites.

2. Prepare rr brg (site DELTA) to handle whl veh traffic NLT 150600 July.

(c) Prep NLT 151800 Jul all nonrecoverable crossing means on the MAIN River (Line ORANGE) for destruction. Be prep to exec on order of the crossing area cdr.

(d) Be prep to construct cbt helipads fwd of Line ORANGE on order.

(e) Be prep to asst the 503d Eng Bn in constructing def and blocking pos west of the MAIN River (Line ORANGE).

(f) Be prep to emplace tactical brg on order.

(g) Be prep to receive 5080th Cbt Spt Equip Co (DS).

(2) 512th Engr Comp Bn HHD. Prov command and control for separate companies.

(3) 5035th Pnl Brg Co. Stand by to prov pnl brg on order.

(4) 5080th Cbt Spt Equip Co.

(a) Prov one plt (DS) to ea co of the 550th Engr Bn (Hv).

(b) Prov equip spt to the 550th Engr Bn (Hv).

(5) 5045th Engr Aslt Fltbrg Co (Ribbon).

(a) Construct a brg NLT 142200 July at site GOLF.

(b) Be prep to pov CL 60 rafts in the bde zone.

(6) 5071st Engr Aslt Fltbrg Co (MAB).

(a) Receive atch of 1 sec from E/53d Engr Bn (-).

(b) Construct brg NLT 142200 July at site CHARLIE.

(c) Be prep to construct a brg at site BRAVO on order.

(d) Be prep to conduct CL 60 rafting at all sites in the bde zone.

(7) E/53d Engr Bn (-).

(a) Construct a brg NLT 142200 July at site HOTEL.

(b) Atch one MAB sec to the 5071st Engr Aslt Fltbrg Co (MAB).

(c) Be prep to convert site HOTEL to a raft site.

(8) E/54th Engr Bn (-).

(a) Construct a brg NLT 142200 July at site ECHO.

(b) Be prep to conduct CL 60 rafting in the bde zone.

j. TM TOM.

(1) Phase I.

(a) OPCON to TF PETE.

(b) Assume responsibility for reserve tgts fwd of the holding line and the rear of Line BLACK, eff 142200 July.

ANNEX G (ENGINEER) to OPORD 5–53d Mech Div

(2) Phase II. Enhance mobility of TF PETE fwd of the holding line.

(3) Phase III. Dissolve; return units to parent unit control.

k. Coordinating Instructions.

(1) Para 3n, OPORD 5–53d Mech Div.

(2) 53d Eng Bn responsible for coord engr effort in div zone.

(3) Report exec of all obstacles immediately to 53d Engr Bn. Submit rept simultaneously through tactical unit to div G-3.

(4) All vehicular brgs across the MAIN River (Line ORANGE) are reserve tgts. Dest only on order or to deny capture by enemy forces.

4. SERVICE SUPPORT

Para 4, OPORD 5–53d Mech Div.

5. COMMAND AND SIGNAL

a. Annex P, OPORD 5–53d Mech Div.

b. Para 5b, OPORD 5–53d Mech Div.

ANNEX H–OBSTACLE (OBSTACLE AND DENIAL) to OPORD 5–53d Mech Div

Reference: OPORD 5–53d Mech Div.

Time Zone Used Throughout the OPORD: ALFA.

1. SITUATION

a. Enemy Forces. Annex A (Intelligence) OPORD 5–53d Mech Div.

b. Friendly Forces. Para 1b, OPORD 5–53d Mech Div.

c. Attachments. Task org, OPORD 5–53d Mech Div.

d. Assumptions.

(1) Para 1d, OPORD 5–53d Mech Div.

(2) The div has been emplacing obstacles since 121500 Jul in spt of the def of Line BLUE.

(3) No more than 50 percent of the engr effort is allocated to obstacle construction.

Appendix 1 (Obstacle Overlay) to Annex H to OPORD 5-84 (Barrier and Denial)

2. MISSION

Engr elements spt the 53d Mech Div delay and def by planning and construction of obstacles in the div zone to inflict casualties on the enemy and slow or halt en fwd of the MAIN River (Line ORANGE).

3. EXECUTION

a. Concept of Operation.

(1) Phase I.

(a) Engr units complete those obstacles that were started before the retrograde and will most enhance execution of the retrograde.

(b) Engr plan and req M-56 missions by aviation assets to supplement existing obstacles.

(2) Phase II.

(a) Engr units close gaps and lanes in reserve tgts/obstacles.

(b) Engr advise and req employment of preplanned M-56 mission by aviation units.

(3) Phase III.

(a) Engr emplace small, hasty obstacles in the holding zone to supplement existing obstacles and to asst the withdrawal of the final units across the MAIN River (Line ORANGE).

(b) Execute obstacles along the MAIN River (Line ORANGE).

b. 53d Engr Bn (-).

(1) Phase I fwd of Line BLACK.

(a) Complete and exec all obstacles indicated on the obstacle plan. Appendix 1 (Obstacle Overlay).

(b) Provide dml firing party and exec on order of bde cdr all reserve tgts.

(2) Phases II and III.

(a) Assume responsibility for exec of all reserve tgts fwd of Line ORANGE and to the rear of the holding line from the 503d Engr Bn.

(b) Req preplanned M-56 missions.

(c) Be prepared to mark preplanned M-56 minefields and to plan and req additional missions.

c. 503d Engr Bn (-).

(1) Phase I between Line ORANGE and Line BLACK.

(a) Complete and exec all obstacles indicated in appendix 1.

(b) Prov dml firing parties for all res tgts until relieved by 53d Engr or TM TOM or ordered to exec the obstacle by TF PETE or bde cdr.

(2) Phases II and III.

(a) Plan and prep obstacles to supplement def pos west of the MAIN River (Line ORANGE).

(b) Be prep to asst TF RAY in the prep of obstacles on the MAIN River (Line ORANGE).

d. TF RAY.

(1) Prep all means of crossing the MAIN River for dml.

(a)	Priority 1	Fixed bridges, veh and rr.
(b)	Priority 2	Tactical bridges/rafts.
(c)	Priority 3	Assault crossing/amphibious sites.
(d)	Priority 4	Foot bridges/civilian ferries.

(2) Prep, prov dml firing party, and exec on order all corps denial tgts.

(3) Exec all MAIN River:

(a)	Priority 4	NLT 152200 Jul NST 151800 Jul 75.
(b)	Priority 1, 2, 3	Prov dml firing party and exec on order of bde cdr.

e. TM TOM.

(1) Assume control of and prov dml firing parties for the reserve tgts between the holding line and Line BLACK and exec on command of Cdr, TF PETE.

(2) Req preplanned M-56 missions in Zone BLACK as required and plan and req additional missions as required.

f. Coordinating Instructions.

(1) Reserve tgts will be manned by constructing unit until properly relieved or tgt is executed.

(2) All reserve tgts will be executed to avoid capture by or passage by en units.

(3) M-56 minefields employed to the rear of friendly units will be marked.

(4) In the absence of the bde cdr, a crossing area cdr (Bn Cdr) can order exec of a tgt on the MAIN River.

(5) Exec of all obstacles will be reported immediately to the 53d Engr Bn.

4. SERVICE SUPPORT

a. Para 4, OPORD 5-53d Mech Div.

b. Matr for gap closure will be stockpiled on site.

c. ASP and aviation units will coord on-loading M-56 system.

5. COMMAND AND SIGNAL

Para 5, OPORD 5-53d Mech Div.

APPENDIX 2 (TARGET LIST) ANNEX H–(Obstacle) OPORD 5–53d Mech Div

The following are lists of targets/obstacles in the Division Zone:
A–Abatis
B–Bridge
C–Road Crater
F–Ferry
M–Minefield
Reference to Appendix 4 (Standard Obstacle) for type obstacle.

ZONE BLUE 1, Priority la

TARGET	COORDINATE	TYPE	SQD HRS	REMARKS
C	NA308705		02	
C	316706		02	
C	324704		02	
C	326658		02	
C	341654		02	
C	344692		02	
C	346615		02	
C	351679		02	
C	352669		02	
C	375681			
C	388666			
C	397660			
A	285672			
A	29			
A				

APPENDIX 3 (LOGISTIC REQUIREMENTS) to ANNEX H (OBSTACLE AND DENIAL) to OPORD 5–53d Mech Div

Reference: OPORD 5–53d Mech Div.

Time Zone Used Throughout the OPORD: ALFA.

Logistic requirements to support obstacle construction are:

Obstacles Constructed Between the MAIN River (Line ORANGE)

TYPE	AMOUNT	WT
TNT	7,868#	7868#
C4	1,370#	
Shape charge	294	
Crater charge	188	
Det cord		

		8#
	90	4500#
M-16	90	1000#
M-14	90	44#

*All bridges assumed to be concrete deck w/steel stringer. Fig in ( ) apply if all reinforced concrete.

APPENDIX 4 (STANDARD OBSTACLES) to ANNEX H (OBSTACLE AND DENIAL) to OPORD 5-53d Mech Div

Reference: OPORD 5-53d Mech Div.

Time Zone Used Throughout the Plan: ALFA.

Standard obstacles (from Div SOP) to be used:

1. MINEFIELDS

a. Type A. (M-56 helicopter delivered mine system.)

Preplanned 300 × 20 meters.

Density - 0.5 mines per meter (.03 mines meter^2).

1 ea OH-1H Sortie required (160 mines)

Average of 45 minutes pe

return at 90 km/hr.

b. Type B.

2. ROAD CRATER (Seven-hole relief face crater, 31' long × 18' wide × 8' deep, augmented by mines.)

a. Materials.

7 ea 40# shape charges	280#
4 ea 40# cratering charges	160#
3 holes requiring 30# of TNT each	94#
4 ea 1# booster charges	
350' detonating cord	
20' time fuze	
1 ea nonelectric cap	6#
1 ea electric cap	
1 ea fuze lighter	
6 ea M-15 AT Mines	
6 ea M-16 AP Mines	
Packaging	

b. Time Required.

3. BRIDGES

Three type

ANNEX I (CROSSING PLAN) to OPORD 5–53d Mech Div

Reference: OPORD 5–53d Mech Div.

Time Zone Used Throughout the Plan: ALFA.

1. CROSSING SITE AND CROSSING AREA

Appendix 1, Crossing Overlay.

2. BRIDGES

a. Type and Capacity of Bridges in 53d Mech Div Zone.

CROSSING AREA	SITE	TYPES OF BRIDGES	CLASS	TIME
BEAR	ALFA	Concrete	70	Open
	BRAVO	MAB	60	On-order
	CHARLIE	MAB	60	142230
TIGER	DELTA	Railroad	100	142230
	ECHO	MAB	60	On-order
	FOXTROT	Highway	100+	Open
LION	GOLF	Ribbon	60	142230
	HOTEL	MAB	60	142230

b. Tentative Priority of Crossing.

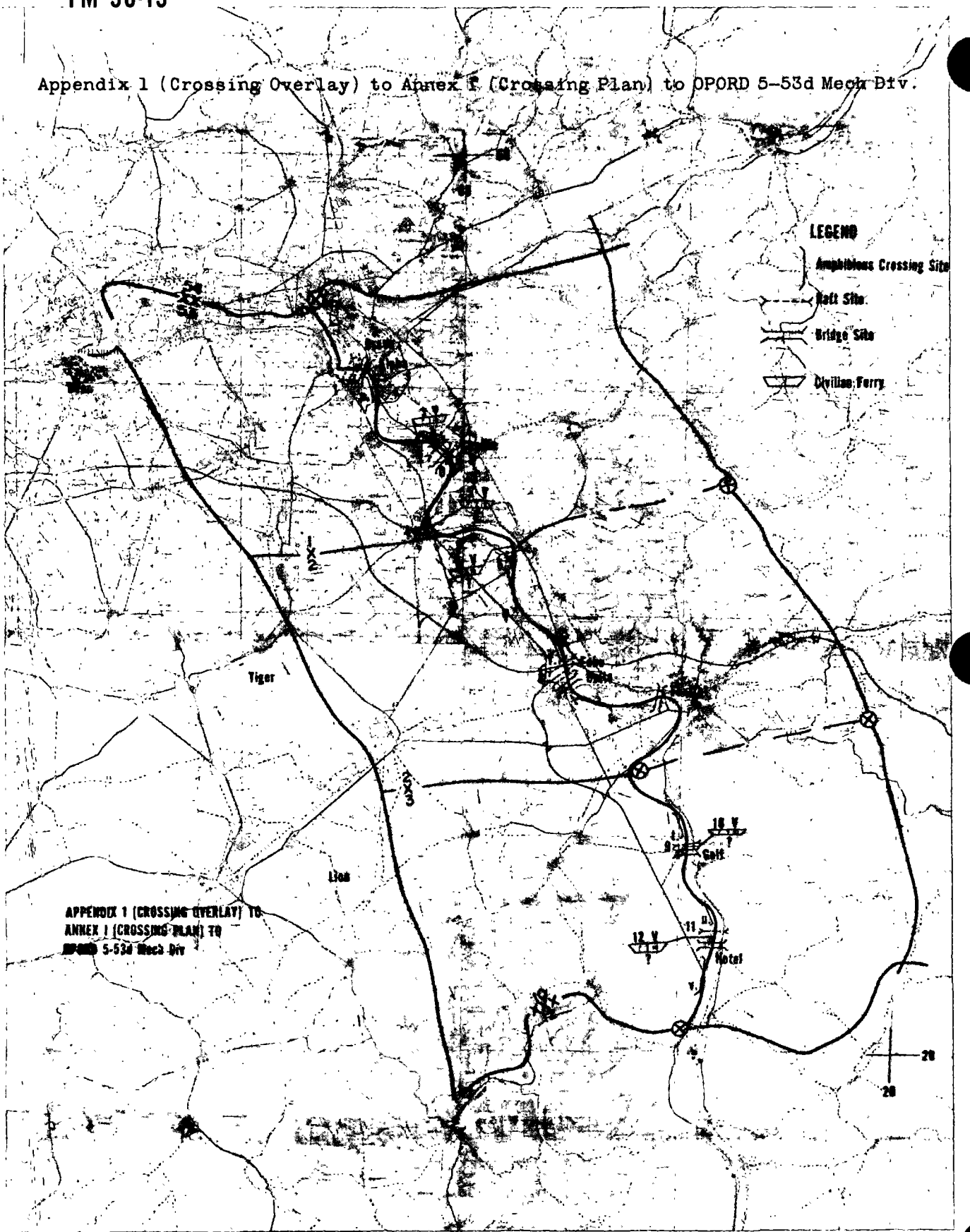
(1) Site ALFA (Existing Class 70, Open)

	TIME		
Phase I	142200–142400	One-way-west	Div Troops
Phase II	142400–150200	One-way-west	Arm TF
Phase III	150200–150300	One-way-west	Div Arty (HQ)
	150300–150400	One-way-west	DISCOM
	152100–152200	One-way-west	Div Arty (175 - 8'' SP)
	152400–160100	One-way-west	Div Arty (155T 8'' SP)
	160100–160200	One-way-west	Arty Bn (155 SP)
	160200–160400	One-way-west	Arm TF

(2) Site BRAVO (Standby class 60, MAB bridge) (1 set LTR)

(3) Site CHARLIE (Installed class '60, MAB bridge–142200)

Appendix 1 (Crossing Overlay) to Annex I (Crossing Plan) to OPORD 5-53d Mech Div.



3. RAFT SITES

a. Type and capacity of mobile assault bridge ferries and ribbon bridge ferries in 53d Mech Div zone:

CROSSING AREA	SITE	RD TRIPS NO. AND TYPE OF RAFTS	ASSETS TO COME FROM	EA HR/RAFT PER (DAY/ NIGHT)	CAPACITY PER HR (DAY) C/12	CAPACITY PER HR (DAY) C/12	CAPACITY PER HR (NIGHT) C/12	CAPACITY PER HR (NIGHT) C/12
BEAR	1	3 MAB (4I, 2E)	Standby BRAVO	7/5	42	84	30	60
	1	3 MAB (4I, 2E)	Disas-semble CHARLIE	7/5	42	84	30	60
TIGER	8	4 MAB (4I, 2E)	Standby ECHO	7/5	60	120	40	80
LION	9	2 ribbon (4I, 1E)	extra GOLF	6/4	12	24	8	16
	9	5 ribbon (EI, 1E)	Disassemble GOLF	6/4	30	60	20	40
				TOTAL	42	84	28	56
	11	3 MAB (4I, 2E)	Disassemble HOTEL	10/6	60	120	36	72

b. Alternate crossing sites are indicated as points 4 and 6, to be employed as the tactical situation requires, using rafting assets from other sites.

4. AMPHIBIOUS CROSSING SITES

BRIGADE	CROSSING AREA	AMPHIBIOUS CROSSING SITE
1st	BEAR	n
		o
		p
2d	TIGER	q
		r
		s
3d	LION	t
		u
		v

5. CONTROL OF CROSSING

a. The following officers are designated crossing area commanders for the indicated areas.

BEAR XO, 1st Bde
TIGER XO, 2d Bde
LION XO, 3d Bde

b. On order, brigades executing phase III assume control from TF DAVE of movement across river and bridging assets within their zone.

c. Civilian ferries will continue operation under German Territorial Forces, at sites 3, 5, 7, 10, 12. Light military vehicles may be used if required.

d. All raft and bridge crossing priorities will be adjusted based on actual opening times of rafts and bridges.

e. Standby Bridge Equipment.

UNIT	AMOUNT	ALT BRG/RAFT SITE	CONST TIME
CORPS MAB	13I, 4E*	BRAVO	45 MIN
		1	20 MIN
		4	1 HR
		6	1 HR 15 MIN
DIV MAB	16I, 8E	ECHO	45 MIN
		6	1 HR
		8	30 MIN
CORPS RIBBON	10I, 10E	9	30 MIN
		11	45 MIN

*I Interior Bay
E End Section

f. Authority to destroy bridges is initially reserved to div commander but may be delegated down to bde upon request.

g. It takes 10 minutes to convert from MAB bridge to MAB rafts and 15 minutes to convert from ribbon bridge to ribbon raft.

h. It takes 15 minutes to remove the MAB bridges and 40 minutes to remove ribbon bridges.

i. Annex I (Surface Movement) (omitted).

Appendixes 1–Crossing Overlay.

ANNEX L (MOVEMENT ORDER) to OPORD 5–53d Mech Div

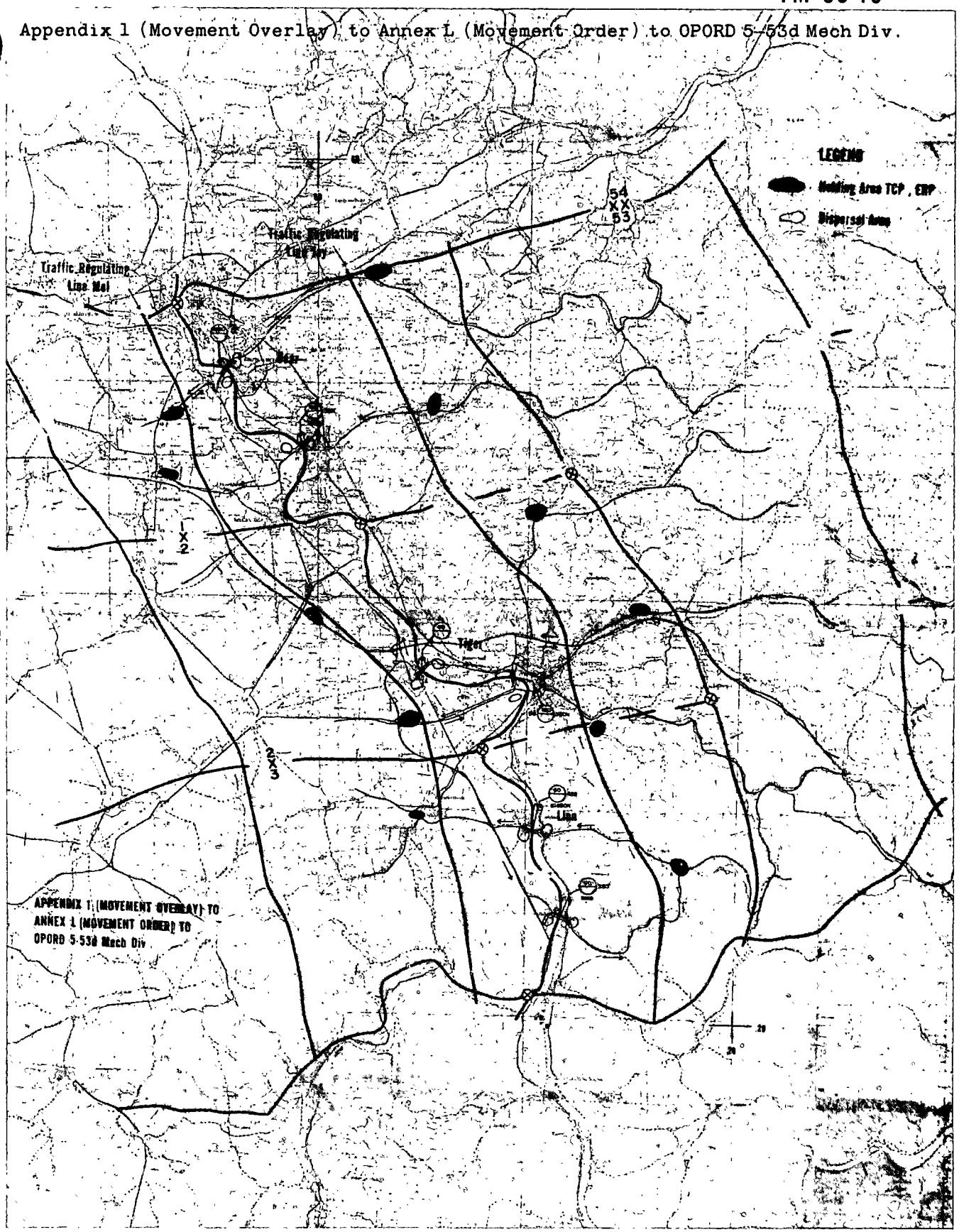
References: OPORD 5–53d Mech Div

Time Zone Used Throughout the Plan: ALFA.

1. ASSEMBLY AREAS, TRAFFIC CONTROL POINTS, AND PHASE LINES

See Appendix 1 (Movement Overlay).

Appendix 1 (Movement Overlay) to Annex L (Movement Order) to OPORD 5-53d Mech Div.



2. RIVER CROSSING TIMES AND LOCATIONS

UNIT	BRIDGES	TIME	
1st Bde	ALFA	142400–150200	Arm TF
		160100–160200	155, SP (-)
		160200–160400	Arm TF
	CHARLIE	150100–150300	Mech TF
		160100–160200	155, SP (-)
		160200–160330	Mech TF
2d Bde	DELTA	150100–150300	Mech TF
		152400–160100	155, SP (-)
		160100–160400	CAV
	FOXTROT	150230–150430	Mech TF
		160100–160200	155, SP (-)
		160200–160400	Mech TF
3d Bde	GOLF	150100–150300	Mech TF
		160100–160200	155, SP (-)
		160200–160400	Arm TF
	HOTEL	152200–152300	155, SP (-)
		152400–160230	Mech TF
DIV ARTY	ALFA	150200–150300	HQ, FATAB
		152100–152200	Div Arty 175; 8
		152400–160100	155T; 8, SP
	DELTA	152400–160100	155T; 8, SP
	FOXTROT	152100–152200	HQ, FATAB
		152200–152300	Div Arty 175; 8
		152400–160100	155T; 8, SP
	GOLF	142330–150030	HQ, FATAB
		152200–152300	Div Arty 175; 8, SP
		152400–160100	155T, 8, SP
	HOTEL	152200–152300	155T, 8, SP

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FM 90-13

1 NOVEMBER 1978

By Order of the Secretary of the Army:

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